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Analyzing Tool Production Problems

Good Tool Engineering Fundamental to Economical Manufacture—Method of Analysis—Results of Alternative Methods of Machining and Set-Up

BY ALBERT A. DOWD AND FRANK W. CURTIS*

HOW does any manufacturer know that he is getting as much production as he should out of a certain number of machines? For example, a certain type of milling machine has a conservative table feed of 4 in. per minute, so that if it were working continuously it would cut 4 x 60, or 240 in. per hour. An 8 hour day then would produce 1920 in. theoretically, without making any allowances for setting cutters, return movement of table, setting up and removing work and other contingencies. All these things absorb a certain amount of time depending on the shape of the work, the machine used, the design of the fixtures and the method of setting up the work.

Good Tool Engineering an Important Factor

The tool engineer must start at the bottom on any manufacturing proposition and give it a thorough analysis in order to determine the most economical method of manufacture. Hence, it is of the greatest importance that he should be familiar with the practical working of various machine tools and also understand the cutting speeds and feeds most suitable for different materials. A faulty or careless analysis of a problem may mean a considerable money loss to the manufacturer.

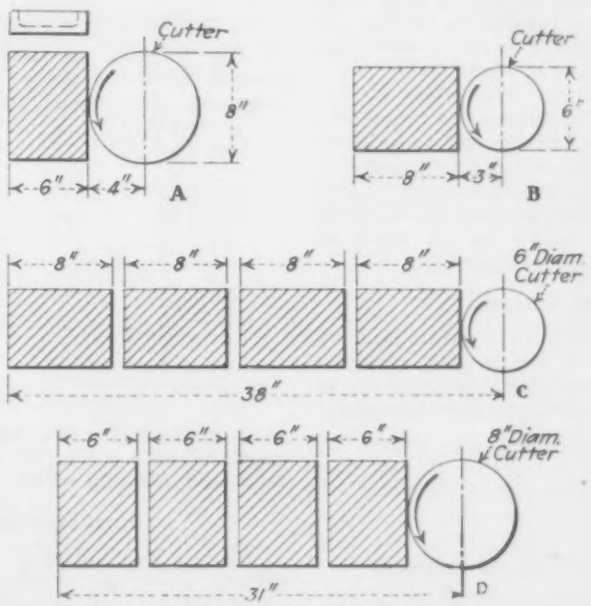

Fig. 1. Comparison of Two Methods of Set-Up

In order to emphasize this point let us consider the work A shown in Fig. 1. This is a cast iron cover which is to be finished as indicated. The production is to be high and the mechanism of which this piece forms a part is a standard product so that the tool equipment should be of the best description. Let us see how a careful analysis of the possible methods of machining will affect the ultimate production.

It will be noted that the work is 6 in. wide by 8 in. long and it may be set up for the process of milling, in two different ways in relation to the cutter. In the upper figure A shows the work set up so that the cutter passes across it in the direction of the 6 in. dimension. The cutter therefore, in this case would need to be a trifle over 8 in. in diameter.

In the figure B the work is set up so that the cutter passes across it in the direction of the 8 in. dimension. In comparing these two methods of setting up it will be seen that in the case A the amount of travel required for the cutter would be half the diameter plus 6 in., or, 4+6=10 in. In the case B the travel required would be half the diameter of the cutter plus the length of the work which is 3+8=11 in. It is evident from the foregoing that a saving of 1 in. in the feed would be obtained by using the first method, although of course it is evident that the cutter is larger in diameter so that its speed would be somewhat slower than the 6 in. size.

In continuous milling when a number of pieces are to be set up, the gain would be correspondingly greater as shown by the diagrams at C and D. In comparing these two and assuming that 4 pieces are set up, the method shown at C would require 38 in. of feed while that shown at D would only require 31 in.

In summarizing we find conditions as follows: Case A: Cutter revolution 25 r.p.m.; feed 0.250 per revolution; time therefore would be 10.00 ÷ 0.25 = 40 revolutions, or 1.60 min. Case B: Cutter revolution 38 r.p.m.; feed 0.180 per revolution; time therefore would be 11.00 ÷ 0.18 = 61 revolutions, or 61 ÷ 38 = 1.60 min. Case C: Cutter 25 r.p.m.; feed 0.250 per revolution; time therefore would be 38.00 ÷ 0.25 = 152 revolutions or 152 ÷ 25 = 6.08 min. Case D: Cutter 38 r.p.m.; feed 0.180 per revolution; time therefore would be 31.00 ÷ 0.18 = 172.2, or 4.53 min. It is evident from the foregoing that method D will give maximum production.

Thus far we have made no allowance for setting up and removing the work from the fixture nor have we given consideration to movements of the table and contingencies such as re-setting of cutters after grinding, etc. Let us forget these matters for the moment and go further in the method of arranging the work.

We have found that method D is capable of giving us the highest production so far as the general arrangement and the direction of the cutting is concerned. Now, assuming that we can use a duplex milling machine or a multiple spindle milling machine and that we can set up the work in such a way that each of these spindles will be cutting at the same time, it is evident that the number of pieces produced would be

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determined by the number of spindles used. Hence, if machines of these types are available and the desired production warrants their use, it would be the part of wisdom to make suitable fixtures for them rather than to use a single spindle machine.

Maximum production can only be attained by giving considerable thought to the type of machines used and the method of setting up the work. Therefore the tool engineer must analyze his production problems mentally or graphically before proceeding with the work. Mental analysis is all right when backed up by years of shop experience and a broad knowledge of the possibilities of machine tools. Graphic analysis

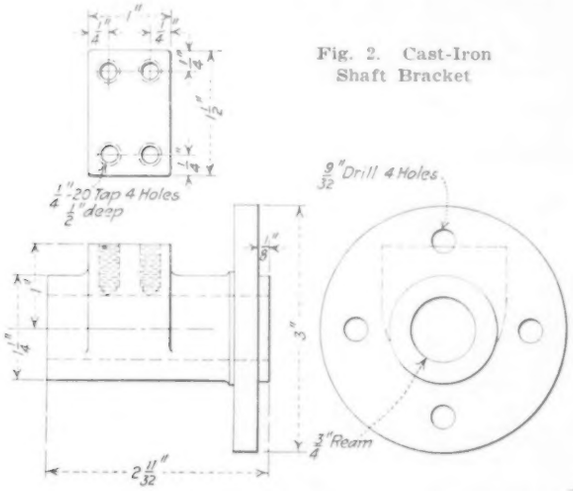


Fig. 2. Cast-Iron Shaft Bracket

is often unnecessary except when work is of such shape that several arrangements are possible in setting up; one of these arrangements being selected after the most advantageous layout has been made.

In regard to the time necessary for setting up and removing the work, this must be reduced to a minimum in order that idle time on the machine will be as small as possible. Methods of clasping should be studied with a view to making the set up convenient and rapid. The examples which have been given are only intended to show possibilities of gain by using various types of machines and different methods of setting up.

Fundamentals of Analysis

It is usually possible to machine a given piece of work in several ways, one of which may be much superior to the others. In analyzing, the points to be considered are production required, accuracy necessary,

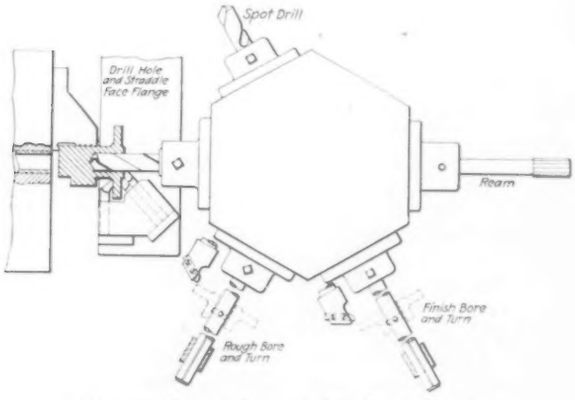


Fig. 3. Turret Layout for Shaft Bracket

machine tools available or to be purchased, and cost of tools.

In considering the production required, we may have three conditions: (1) small production in small lots, going through the shop in lots of from 25 to 100, several times each year; (2) moderate production, requiring one or two machines working part time for several months; (3) high production requiring a number of machines continuously throughout the year. Each of these conditions requires analysis to determine the best method of machining based on the amount of production required. A basic principle which applies to all three conditions is "Keep the machine cutting as great a proportion of the time as possible."

In considering the accuracy necessary, we may also have three conditions: (1) rough work with large tolerances; (2) well finished, medium tolerances; (3) very accurate work, close tolerances. In the first case we may use a single cut with coarse feeds; in the second case, a single cut with moderate feeds; and in the third case, two cuts—one roughing, one finishing—which would require careful setting.

In considering the machine tools available or to be purchased, the production required is again a factor. For small or medium production when a number of different fixtures are to be used from time to time on the same machine, attention must be given to the length of time needed to set up the fixtures, adjust cutters or tools. Set blocks on fixtures and tool setting gages of various kinds are great time savers; they also tend to produce uniformity in work and greater accuracy. For large production it may often prove to be economical to buy new machine tools particularly suited to the work.

In considering the cost of tools, jigs, fixtures, gages, etc., necessary for production, first cost is not the principal item. The proportion of cost should be according to production required but rapid handling is of value either for high or low production. Because a cheap fixture is indicated it is not necessary to sacrifice labor time. It is better to put the labor into the fixture than into the production and it will be more profitable in the long run. It is poor economy to make a cheap fixture which requires a long time to set up and the designer should always keep this point in mind when planning his production methods.

Examples Showing Varied Practice

Fig. 2 gives an example of a cast iron shaft bracket which is to be machined as indicated. In analyzing the methods which can be used for this

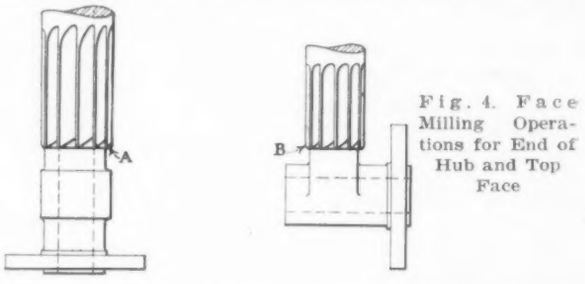


Fig. 4. Face Milling Operations for End of Hub and Top Face

piece of work the following tentative operations are suggested with a view of making comparisons between them and deciding which one is best.

First Method of Machining

Op. 1. Machine used, screw machine. Method of holding is by the outside in three jawed chuck with special jaws; drill long hole through hub; bore hole rough, finish and ream. Face both sides of flange, size small hub and turn outside diameter.

Op. 2. Face small end of work. Hold the work on a stud using an end mill for facing the end.

Op. 3. Face top surface. Locate the work on a milling fixture and use an end mill for the operation.

Op. 4. Drill all holes. Set up the work in a turnover drill jig and use multiple drill heads on a two spindle drilling machine.

Op. 5. Tap all holes on a tapping machine.

Fig. 3 shows a method of setting up the work for the first operation on a screw machine, the various tools used being indicated in the diagram. Attention is called to the fact that the drilling operation is taking place while the facing cuts are being made on the flange. This necessitates a speed suited to the facing operations and as a consequence the drilling time is increased considerably. Also, as concentricity between the tool and the flange is important, two boring operations and one reaming operation are necessary in order to preserve the accuracy.

Fig. 4 shows at A a method which can be used for

facing the small end of the hub with an end mill on a simple fixture used on a milling machine. The illustration B in the same figure shows an end mill being used to face the top surface of the casting. This work also is done on a milling machine. Both of these two settings are simple and do not require expensive fixtures.

Fig. 5 shows the drilling operations for all holes in the work. The jig used is of the turn-over type which allows the small holes in the top face and the holes in the flange to be drilled without removing the work from the jig. Multiple drill heads would be provided

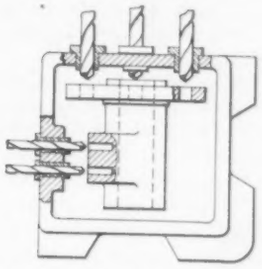


Fig. 5. Drilling Operation for All Holes

for both groups of holes and these heads would naturally be set up on a two spindle drilling machine. The tapping operation for the ¼-in., 20-thread holes can be handled on a tapping machine or on a drilling machine with a tapping attachment.

The estimated time for all of these operations on one piece is 9½ minutes.

Alternative Method of Machining

The sequence of operations for another method of handling is as follows:

Op. 1. Drill 11/16 in. hole in end of hub and spot face the small end; op. 2. Broach ¾-in. hole; op. 3.

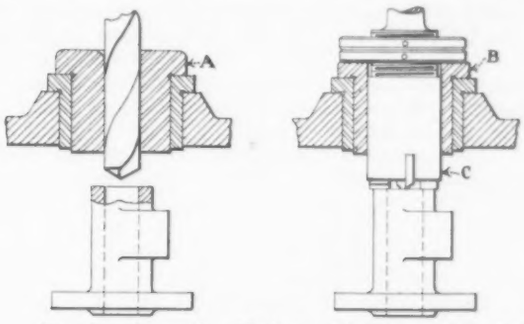


Fig. 6. Alternative Method of Drilling Center Hole and Facing Hub

Turn and face flange and small hub; op. 4. Drill flange holes; op. 5. Face top; op. 6. Drill four holes in top; op. 7. Tap all holes.

In this method the work is set up on a drill press in a centering chuck. A supporting bracket is arranged with two slip bushings A and B, Fig. 6, the former being used for the drill as indicated, and the latter used for facing the end of the hub in connection with a special facing tool C. By using a chuck such as the Wizard the change from one tool to the other can be rapidly made and the fixtures required are simple and economical.

As we now have obtained a drilled hole and a surface square with the hole, we can easily broach the hole as indicated in Fig. 7, using a broaching machine for the work. As no fixtures are required for this operation the cost of equipment means practically

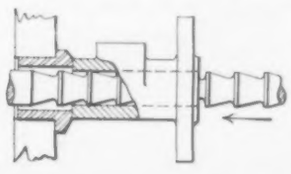


Fig. 7. Broaching Operation for Center Hole

nothing except the cost of the broach. Fig. 8 shows at A the drilling of the flange holes and at B the drilling of the holes in the top face. In this case these two operations are handled in two separate jigs. This is done in order to avoid making a turn-over. Fig. 9 shows the work A set up on an arbor on an engine lathe in such a way that by using a special tool block B at the rear of the machine and a turning tool C at the front the various operations of facing and turning can be rapidly done. The fact that the work is set up on an arbor makes it possible to obtain concentricity of the various surfaces without difficulty.

The last operation on the work is that of tapping the four holes and can be done in the same manner as that suggested in the first method. The total estimated time for this alternative method of handling is 6¾ minutes.

Comparison of Methods

In comparing the two methods described it will be seen that the second method effects a saving of 2¾ minutes on each piece, and from the viewpoint of increased production it is therefore the best of the two. In addition to this, the cost of tool equipment is very much less in the second case than in the first, so that this is also an added advantage. The case illustrated

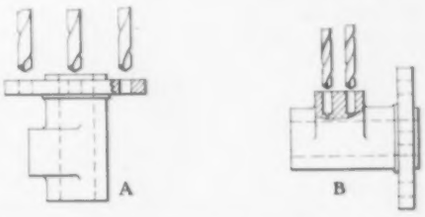


Fig. 8. Alternative Drilling Operations

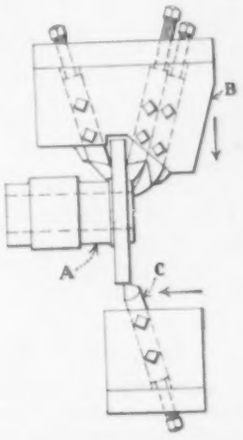


Fig. 9. Multiple Cutting Operation for Flange End

is a simple one, but it has been selected in order to show the advantages of different methods of setting any given piece of work.

Harding Bust in McKinley Memorial

J. D. Waddell, president Mahoning Valley Steel Co., Niles, Ohio, presided on June 18 at notable ceremonies in connection with the unveiling of a bronze bust of President Harding at the National McKinley Birthplace Memorial in Niles. Joseph G. Butler, Jr., vice-president Brier Hill Steel Co., Youngstown, Ohio, who was instrumental in having the Harding bust designed, was a guest of honor. Speakers were Vice-President Calvin Coolidge, Secretary of Labor James J. Davis, Governor Harry L. Davis of Ohio, and others. Several hundred members of Niles lodges of the Amalgamated Association of Iron, Steel and Tin Workers marched in a parade which preceded the exercises.

Secretary of Labor Davis referred, in his remarks, to the time when he worked in the mills, more than twenty years ago, as a puddler. "We made five heats to the turn," he said, "with 500 to 600 lb. in every heat, and occasionally a good old cobble ball." He advised employers and employees to "get the spirit of fraternalism which means fellowship and comradeship," if industrial strife is to be avoided. "You employees, call your employer the greatest employer in the world! And likewise let the employer frankly say of his men that they are the greatest workmen in the world."

Heat Treating Boxes

A new line of carbonizing and case hardening boxes, patented, has been brought out by the Pioneer Alloy Products Co., Cleveland. These are made of a patented heat resisting alloy steel containing sufficient chromium to make it non-oxidizing.

To increase the resistance to warping and cracking which appears in square and rectangular boxes, both round and cylindrical forms, have been adopted. Two reasons are given for this trouble in square boxes. One is that cooling strains develop in the flat sides of square boxes when the metal shrinks against the hard core during casting; the other is that planes of weakness are caused by the crystals of the metal forming at right angles to each other in the corners, this weakness causing the separation of the crystals, and consequently cracking.

It is stated that advanced molding practice can be followed in making the boxes with round sections, thus reducing the strains set up in cooling, and as there are no corners to form planes of weakness, the possibility of warping and cracking is reduced to a minimum. With boxes of this design it is said that a medium-priced alloy can be used that will not oxidize during heating and cooling. The company reports that the boxes have shown excellent results in service, this being especially true when the cylindrical shaped box has been used in the heat treatment of cam shafts and other parts that require a long, narrow box.

Carbonizing Pots of Rounded Form, Designed to Avoid Cracking from Heating and Cooling Strains

Competing with English Makers

WASHINGTON, June 21.—That foreign competition with English makers in pig iron has been the cause of a reduction within the past two months of approximately 70 shillings per ton in Cleveland iron prices is shown by statistics recently published by the Tees Conservancy Commission, according to a report received from Consul Fred C. Slater, Newcastle-on-Tyne, England, writing under date of May 3.

During the six months Nov. 1, 1920, to April 30, 1921, it is stated, Holland, Belgium, France and Sweden have sent the following amounts in tons into the large smelting district of Middlesbrough:

	1912-13 6 Months	1913-14 6 Months	1920-21 6 Months
Pig iron	453	106	14,135
Billets, slabs, etc.	16,635	24,134	16,013
Plates, bars, angles, etc.	14,041	13,460	12,834

The report states that it is recognized that Cleveland pig iron prices must fall another 25 shillings, making the market value approximately 100 shillings before foreign prices are met. In this regard, the report points out, it was recently stated that there were immense stocks of pig iron on hand manufactured at a high cost and upon which the makers would have to sacrifice pounds to move the supply.

Bituminous coal, to the extent of 167,454,000 tons, has been raised up to June 4, according to a report compiled by the Geological Survey, as compared with 216,890,000 tons up to the corresponding date last year; a loss of 49,436,000 tons or 22.8 per cent. The production so far this year is by far the lowest of the past five years, and lacks more than 70,000,000 tons of the high figure of 1918.

Aluminum Solders and Corrosion

All tests of recent aluminum solders have been completed by the Bureau of Standards and Circular 78, "Solders for Aluminum," will now be revised to include these tests. In spite of claims made by those interested, no solder for aluminum has yet been found which will withstand the corrosion test, although the fused zinc chloride solders withstand corrosion for the greatest length of time. Recently the Library of Congress submitted for test by the Bureau of Standards some copper sheets for roofing purposes which had been joined by brazing. Two types of joints were used, a simple lap joint and a lock joint in which the edges of the two sheets to be joined were first bent double and then "locked" into one another.

The series of examinations indicated that of the two types of joints, designated as lap and lock, the lap joint is superior in strength and much more desirable in its structure. In forming the lock joint, apparently it is necessary to apply the heating torch for a considerably longer period in order to cause the metal to flow into the joint. In doing this the upper fold of the sheet which forms the lock is highly heated and often burnt. It was noticed in most cases that none of the brazing metal penetrated directly below the upper fold so that the upper sheet could easily be bent along the line of the junction. It appears from the results of this examination that if the buckling of the sheets, which apparently cannot be entirely prevented with this method of joining sheets, is not too objectionable, the lap joint should be satisfactory for the purpose. The lock joint is decidedly inferior in strength and other properties to the lap joint. The joints should be carefully cleaned after brazing, the Bureau of Standards says. In the specimens submitted the film of zinc chloride remaining after cleaning the specimens was sufficient to accelerate atmospheric corrosion very decidedly within a very short time.

Rates Determined by Cost of Living

WASHINGTON, June 21.—Rates per hour for its employees are to be governed by the cost of living at the Coventry, England, plant of Singer & Co., manufacturers of sewing machines under an arrangement made with workers and by which it is hoped more employment will be provided. The arrangement entered upon is to operate until October and thereafter is to be prolonged by mutual adjustment. The present rate has been based upon the Board of Trade index figures of the cost of living at 133 points over the pre-war level, according to a report received by the Bureau of Foreign and Domestic Commerce from Consul Wilbur T. Gracey, Birmingham, England. Any rise or fall of 10 points will mean the addition or reduction of 1d. ($0.02 normal rate) per hour.

The American Italian Commercial Corporation, 2 Rector Street, New York, announces that its rights to the Piron coke ovens in the United States have been transferred to the newly organized company, the Piron Coal Distillation Systems, Inc., 43 Broad Street, New York, of which Emil Piron is president and chief engineer and Felix Golde, vice-president. John D. McGrath is also a vice-president. The new company has been incorporated for $2,300,000. Mr. Piron is a Belgian and the Piron oven is a Belgian oven.

Fitting the Cupola to Its Work

Cupola Operation—Physical and Chemical Factors as Related to Efficiency—Position of Fusion Zone

BY Y. A. DYER*

IN cupola operations the physical equation is so closely related to the chemical equation that to neglect the one necessarily means the disturbance of the equilibrium of the other; therefore a rational balance in each case should be sought by the operator. To proportion properly the areas and accessories of a cupola is one important feature; to balance operating conditions is equally important. It should also be scrupulously borne in mind that, under the most perfect prevailing conditions of the former feature, there may be expected the ever present unseen factors which operate under the latter, which therefore have to be dealt with in a practical manner. This may be referred to as cupola technique and this feature is eminently true of all shaft furnace operations.

Melting Zone Location Determined

Foremost of the physical features to be reckoned with in operation is the melting zone. It should be located definitely, and the coke bed adjusted by measure to its position. That is: when cupola construction shall have been checked and so adjusted that the known proper and constant volume of air is being delivered at a pressure commensurate with the size of cupola under consideration, careful note should be made of the "ringed" or slightly depressed and scorified condition of lining above tuyeres. The scorified point will closely approximate the true zone of fusion, or point of greatest heat. It may be stated, however, that about 3 in. above and 3 in. below this point constitutes the range of final superheating and melting area. That is: the iron in passing through this zone of 6 to 6½ in. must receive its intense superheat and be fused.

As a check for adjustment of bed, timing of "first liquid metal down" may be effectively used. Should the metal be seen to trickle over the coke in front of tuyeres ten to twelve minutes after blast on, the bed will be approximately correct; if it appears below ten minutes the bed will be too low and should be raised; if seen much beyond twelve minutes the bed will be too high and should be lowered. That is: if liquid metal in a 42-inch cupola should appear at the tuyeres within 7 minutes after blast on, the bed may be raised about 3 in., or increased in weight by approximately 75 lb.; if seen 15 minutes after blast on, the bed may be lowered 3 in., or decreased to the extent of 75 lb. When proper depth of coke bed shall have been ascertained, an iron rod—bent at right angle—may be lowered from cupola door until bent portion rests on the coke, then upper portion of rod may be bent—at opposite right angle—to rest on jamb of cupola door. This rod, if kept free of kinks and bends, may then serve as standard measure for a well burned coke bed.

In well proportioned and rationally operated cupolas the melting zone may be expected to exist between 18 and 36 inches above the bottom of tuyeres, depending on size of cupola, tuyere area and driving conditions. The greater the velocity of the blast in the cupola, the higher up will be the most complete combustion—therefore a higher melting zone will obtain. Below melting zone the temperature rapidly decreases and free oxygen increases, therefore iron melted in this area will likely be dull and lifeless by reason of containing oxygen and being melted at low temperature.

Coke Bed Highly Important

The total height of fuel bed in cupolas with tuyeres located 16 to 18 inches above bottom may range from 34 to 52 inches, or 36 to 54 inches—measured from sand bottom to top of bed—depending on size of cupola and operating conditions. The height of bed above bottom of tuyeres, therefore, may vary from 18 to 36 inches in either case. To obtain approximate weight of fuel on bed, ascertain the number of cubic feet in any given size cupola, measured from sand bottom to top of fuel bed, then multiply cubic content by 30 (fair average weight of a cubic foot of coke of ordinary structure and size packed on bed).

Thus, a 42-in. cupola of 9.62 sq. ft. area, having melting zone located approximately 24 in. above tuyeres and being 40 in. deep, will contain (9.62 x 3.333) = 32.06 cu. ft., or require a coke bed of approximately (32.06 x 30) = 961 lb. to fill the space. Therefore, 100 lb. of such coke will fill $\frac{40}{9.61}$ = 4.16 in. in a 42-in. cupola.

However, this method of computing coke bed weight should not be indulged in, except to approximate the pounds of coke used for fuel bed, or for calculating adjustment of coke bed up or down. The fuel bed should be accurately measured to point of melting zone, because heavy oxidation of metal may result from either too high or too low coke bed—more especially the latter, if care be not given the matter of wind volume and pressure.

A coke bed too low, or below the melting zone, permits the metal to come in direct contact with a severe oxidizing blast somewhat resembling the cutting effect of the oxy-acetylene flame. Oxygenated metal will be the net result of such operations, and a sluggish iron may be expected—one which will freeze easily and contain, when solidified, blowholes, cold-shuts, shot, globules and numerous other imperfections.

A coke bed too high, or above the melting zone, permits the metal to remain at white heat in an area of near fusion while the coke bed is being burned away to adjust itself to the melting zone, and should there by chance be free oxygen present in the gas mixture an ideal condition for oxidation of metal will occur. Therefore, to minimize conditions for oxidation of metal, the coke bed should be kept "flush" with melting zone at all times during the progress of a heat. Maximum oxidation of iron should be traceable to its absorbing oxygen on its descent to the hearth—a condition beyond human efforts to control in shaft furnaces of present construction.

Comparatively small size coke should be used on bed—4 to 6 in. coke of sufficient hardness, density and porosity. Bulky and irregular size coke creates an area of large voids, thereby facilitating freer penetration of uncombined oxygen through the charges to the upper layers of metal.

There are at least two good and sufficient reasons why the coke bed should be well burned through before charging begins and blast on. First, to insure complete combustion of wood or shavings used to kindle coke so that the bed may completely settle to the melting zone. Same reasoning applies to a torch-lighted bed. It is also well to anticipate the depth of settling, caused by pressure incident to heavy charges, and make provision accordingly for some extra coke on bed—say 2 to 3 in. above center of scorified point in lining. This precaution may forestall a bad "start off" with reference to relative positions of first iron charge and melting zone. Second, to create sufficient temperature before blast on, to heat and ignite the gases for preheating the charges of iron.

Coke Melting Ratio

Much has been written and said on melting ratios, but, after all, the factors encountered are too numer-

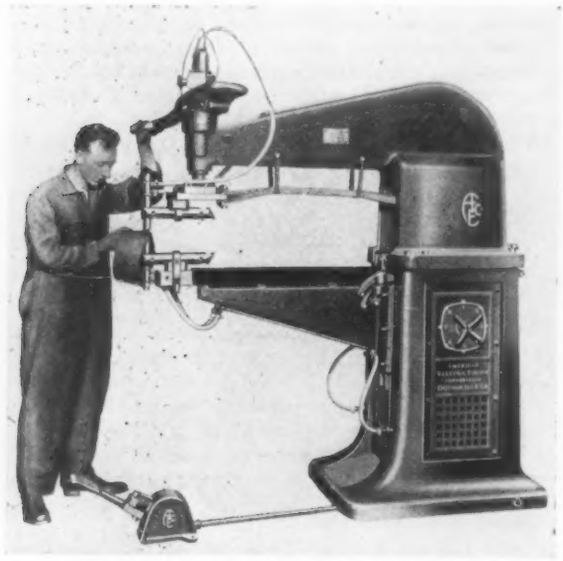
(*Continued on page* 1727)

*Birmingham, Ala.

Spot Welding Machine

A line of electric resistance spot welding machines of the type shown in the accompanying illustration has been recently put on the market by the American Electric Fusion Corporation, 1906 North Halsted Street, Chicago. The machine is furnished in sizes having nominal throat depths of 12, 24, 36 and 48 in.

Among the features may be mentioned the special ways of T-beam construction that have been sunk in the face of the machine to give firm support to the arm. The horn, instead of having a single butting-back contact with the block, fits between two ways which are pressed against it by clamps, thus providing



Welding Point Holders Are of One Piece, Die Formed from Copper. Draw bolts are of Monel metal instead of iron or steel

double contact and freeing it from tendency toward gapping.

Special attention has been given to the design of the welding point holders and electrode clamps. Each point holder is of one piece, die-formed from copper, and the draw bolts made of Monel metal. The groove provided in the bolt for the cooling water has been made large to prevent clogging with sediment and clogging by rust is eliminated by the use of Monel metal instead of an iron or steel bolt. For clamping the point holders to the electrodes a special locking device is provided which consists of a self-tightening bolt which presses against the sides of the hole in the electrodes in which it rests. The advantage of this construction lies in the complete contact between holder and electrode, effectively eliminating the forming of a magnetic circuit around the holder, choking the welding current and generating useless heat.

The foot treadle may be adjusted to any angle and is of the same length for all sizes, being brought under the welding point by using different lengths of connecting rod for different machines. A spade handle is provided for hand operation and can be used from any position around the machine without disconnecting the treadle rod.

The lower arm of the throat is raised and lowered by rack and pinion and is equipped with a ratchet and pawl gear stop.

War Claims by Producers of Manganese, Chrome or Tungsten Ores

WASHINGTON, June 21.—The bill to liberalize the war minerals act so as to provide compensation to all claimants who, in response to personal, written or published request on demand from the Department of Interior, War Industries Board, the War Trade Board, Shipping Board of Emergency Fleet Corporation, for the production of manganese, chrome and tungsten ores and pyrites, was passed by the Senate last Friday. It has been sent to the House for action. The existing act limits payments of claims to contracts. The only amendment made to the liberalized bill was offered by Senator Jones of Washington and provides a restriction that, if proof already filed clearly shows the claims are not justified, they are not to be paid.

International Engineering Standards

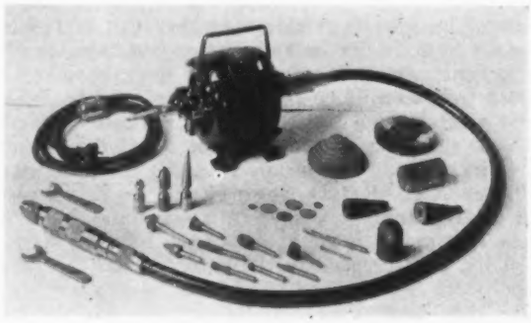
At a conference in London, called by the British Engineering Standards Association, Belgium, Canada, Great Britain, Holland, Norway, Switzerland and the United States were represented. Notwithstanding great differences in details, the same general method of work is followed in the different countries, technical decisions concerning any specific piece of work being in the hands of a working committee broadly representative of the particular branch of national industry concerned. This method is followed for specifications, methods of test, or dimensional standardization.

It was the view of the conference that international co-operation in industrial standardization work should proceed along informal lines, based primarily upon interchange of information on active subjects of mutual interest, rather than by any attempt at present to form a general international standardizing body; that in cases in which formal organization should be found necessary, the organization should preferably be by subject or industry, somewhat along the lines of the International Electrotechnical Commission, but that efforts should first be made to secure results by less formal methods; and to this end it would often be desirable that, in a given subject, the office of one of the national bodies most interested should, by informal agreement, perform such secretarial functions as would further international agreement in the particular subject.

Improved Electric Flexishaft Outfit

An electric Flexishaft outfit for die sinkers, aluminum and brass pattern work, buffing and light utility bench work has been placed on the market by the Coates Clipper Mfg. Co., Worcester, Mass. It is offered as an improvement over the company's previous design.

In the previous design the hand piece stalled the motor at 20 lb. applied pressure and became heated. In the new design the motor will run at 65 lb. pres-



Pressure of 65 Lb. Can Be Applied to Hand Piece Without Slowing the Motor or Heating the Case

sure on the hand piece without slowing down and without heating the case. The improved hand piece is of cold rolled steel 1¼ in. in diameter, and 5 7/16 in. long with chuck jaws closed and 5 9/16 in. with chuck jaws open. Both ends are equipped with annular ball bearings and the radial and thrust bearings are adjustable to take up wear. The chuck holds tools up to ¼ in. and is removable to permit the use of larger tools on the end of the shank. The bearings of the hand piece are packed with sufficient light grease to last six months, oil holes having been eliminated.

The cable shaft is 4 ft. long and made of Coates ⅝ in. piano wire. It is hardened on both ends, ground to fit the bearings and encased in a flexible metallic cover with nickel-plated sleeves. The outfit is equipped with a ¼ hp. standard motor with both ends of armature shaft extended. Current is taken from a lamp socket and a snap switch is provided on the motor. The weight is given as 30 lb. and the measurements 8 by 7 by 10 in., exclusive of shaft.

Designing Hot Blast Stoves*

Proportioning the Passes and Brickwork of the Checkers for the Work They Have to Do—Combustion and Heat Transfer Problems

BY W. E. GROUME-GRJIMAILO†

OUTER walls of stoves are usually made of 18 in. of brick, with an air space of from 1 to 2 in. A cyclic change in temperature occurs in the inner portion of this wall, while the outer portion will give a temperature gradient toward the air space. Due to the fact that the heating and cooling periods are not equal, and there is a constant heat or temperature loss through the wall, the analysis of this cycle is not simple. The central portion of the wall has a small temperature change. There is a constant flow of heat

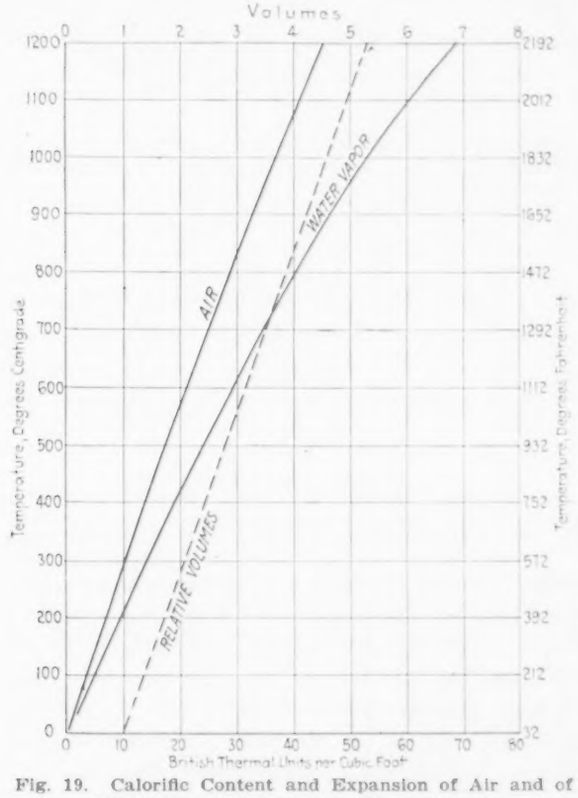

Volumes
0 1 2 3 4 5 6 7 8
1200 1100 1000 900 800 700 600 500 400 300 200 100 0
2192 2012 1832 1652 1472 1292 1112 932 752 572 392 212 32
AIR
WATER VAPOR
RELATIVE VOLUMES
Temperature, Degrees Centigrade
Temperature, Degrees Fahrenheit
0 10 20 30 40 50 60 70 80
British Thermal Units per Cubic Foot

Fig. 19. Calorific Content and Expansion of Air and of Water Vapor at Increasing Temperatures

to the outer surface and a periodic flow from and to the inner wall surface, according to whether the stove is at the beginning or at the end of the heating or cooling period. The heat loss at the top of the checkerwork will be, naturally, several times as rapid as at the cooler end. Hence if heat insulation is applied it is necessary to use a greater thickness at the top. In determining the amount of insulation required, a study of the temperature cycle of the wall should be made, as it will throw an important light upon the subject.

Loss of Draft Through Checkers

The frictional loss through the checkerwork may be approximated by the formula developed by W. A. Mojarow and given in the *Revue de Mètallurgie*, May, 1914, page 320. This formula is as follows:

$$F = m \frac{SL}{A} v_t \ p_t$$

Applying this formula to the conditions when the stove is on air, the values of the quantities are as follows:

m = Coefficient of friction determined by Mojarow as 0.00307 (= 0.016 in metric system), by observations made upon Cowper stoves.

SL = The heating surface, S being the perimeter of the passes and L their length, for this case = 51,000 sq. ft.

A = The area of the passes = 79.65 sq. ft.

v_t = Average velocity of gas = 8.63 ft. per second.

p_t = Weight of the gas at temperature and pressure = 0.0696 lb. per cu. ft. for air at one atmosphere and an average temperature of 680 deg. Fahr.

Substituting these numerical values in the formula, the frictional resistance to the passage of the blast is found to be equal to 1.18 in. of water.

Considering the possibility of obtaining higher blast temperatures, say 1650 deg. Fahr., supplying the same volume of blast as the stove tested, 593 cu. ft. of free air per second:

Blast Temperatures:

Maximum of hot blast	1650 deg. Fahr.
Cold blast main	160 deg. Fahr.
Rise in temperature	1490 deg. Fahr.
Average temperature	905 deg. Fahr.

The heat capacity of the blast, per cu. ft., is obtained from a curve, Fig. 19, plotted from Table 9, as follows:

Heat capacity of hot blast at 1650 deg. Fahr., 33.2 B.t.u.
cold blast at 160 deg. Fahr., 2.53 B.t.u.
Absorbed by blast in increase of 1490 deg., 30.67 B.t.u.

The total amount of heat absorbed by the air in heating during each second the stove is on air will be:

$$593 \times 30.25 = 18{,}180 \text{ B.t.u. per second}$$

With a cycle of one hour upon air, the total amount of heat per cycle carried away from the stove by the blast will be:

$$18{,}180 \times 3600 = 65{,}448{,}000 \text{ B.t.u.}$$

In making the following computations, no allowance has been made to cover the heat lost through the walls of the stove, or the necessary volume of gas to be burned to supply this heat. The amount of gas required will depend in part upon the heat loss and the insulation applied to prevent such loss, whether the gas and the air for its combustion are preheated or not, the design of the combustion chamber, etc. The possibilities of hot blast stove design have not been as well appreciated as they might be.

Detail improvements in burners and valves, with their comparatively slight opportunity for improving the results obtained in producing hot blast, have obscured the greater possibilities of increasing the temperature of the blast by rational construction. Multiple pass stoves have comparatively little excuse for existence. The main advantage of an even number of passes is the location of valves, etc., near the bottom of the stove. Three-pass stoves are not only irrational in design but locate valves near the top of the stove, where trouble is not only difficult to detect, but hard to remedy.

Figuring Brick and Pass Volumes

Assuming that a temperature change in the checker brick of 180 deg. Fahr. is permissible, the weight and volume of brick required will be:

$$\frac{65{,}448{,}000}{180 \times 0.25} = 1{,}454{,}400 \text{ lb. } (\div 112 = 13{,}000 \text{ cu. ft.})$$

These values do not allow for heat loss. That is, this volume of brickwork would have a temperature change, when heating, of from 35 to 90 deg. Fahr. greater than when on blast, as the 180 deg. change is the change covering the heat transferred to the blast.

Blast temperature increases 1490 deg. in the check-

*Copyright, 1921, by A. D. Williams.

†Translated by A. D. Williams. Concluded from page 1616, June 16 issue THE IRON AGE.

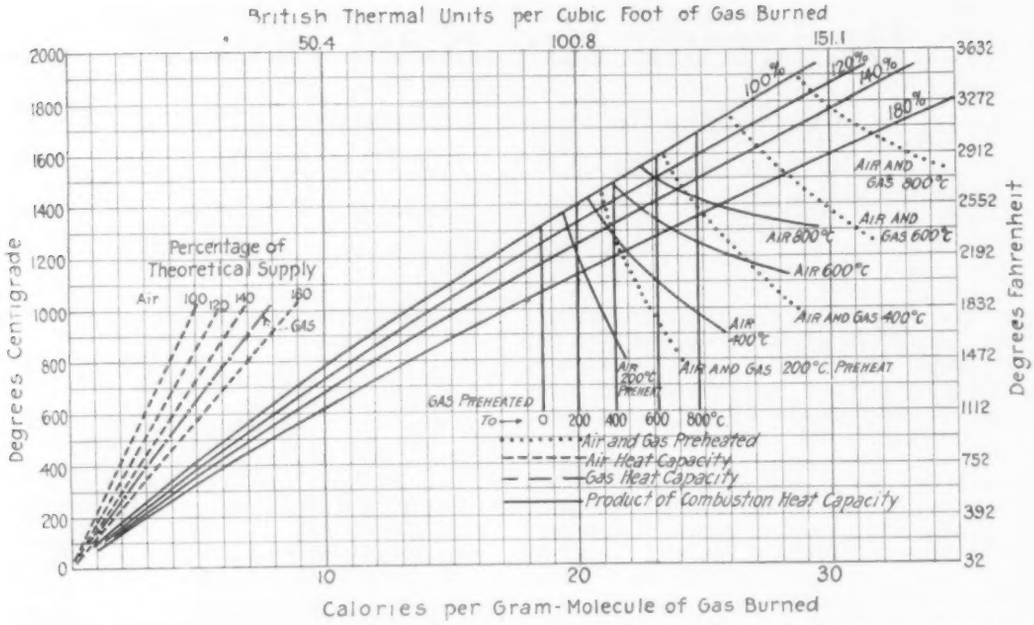


Fig. 20. Heat Capacity and Calorific Intensity of Blast Furnace Gas with Instantaneous Complete Combustion in an Athermal Chamber

ers. The average rate of increase assumed will determine the time allowed for heating, and with the blast volume the space required in the checker work. Assuming a heating rate of 180 deg. per second, the time necessary will be 8.3 seconds. Slower or faster rates of heating will correspondingly affect the time, as well as the space required to contain the blast while heating. The volume of free air blown per second is 593 cu. ft., its average temperature in the checkers is 905 deg. Fahr., and it is under a pressure of one atmosphere, the volume under these conditions being 824 sq. ft., which, multiplied by 8.3, the heating time, fixes the space required as 6840 cu. ft. The total checker volume will be, therefore, 6840 + 13,000 = 19,840 cu. ft.

The brick coefficient = 13,000 ÷ 19,840 = 0.6553
The pass coefficient = 6840 ÷ 19,840 = 0.3447
The side of the square for the pass unit
$= \sqrt{0.3447} = 0.587.$

The portion of the unit square occupied by the brickwork will be 1.000 — 0.587 = 0.413.

As the cooling time of the stove is one hour, it is not desirable to make the wall thickness between the passes greater than 3 in.; therefore the side of the unit square will be = 3 ÷ 0.413 = 7.26 in., or say 7¼ in. The diameter of the square pass will be 7¼ — 3 = 4¼ in.

The area occupied by a checker unit $= (7\frac{1}{4})^2 = 52.5$ sq. in.
The area occupied by the pass $= (4\frac{1}{4})^2 = 18.1$ sq. in.
The area occupied by brick = 34.4 sq. in.

The lineal amount of checker required, based upon the pass = $6840 \div \frac{18.1}{144} = 56{,}800$ ft., or if based on the brick = $13{,}000 \div \frac{34.4}{144} = 54{,}420$ ft. Using the larger of these values and assuming a checker height of 80 ft., the number of passes = $\frac{56{,}800}{80} = 710$.

The total area occupied by the passes
$= \frac{18.1}{144} \times 710 = 89.25$ sq. ft.

The total area occupied by brick
$= \frac{34.4}{144} \times 710 = 169.6$ sq. ft.

Checker area = 258.85 sq. ft.

The perimeter of one pass = 4¼ × 4 = 17 in.
The total perimeter = $\frac{17}{12} \times 710 = 1006$ ft.
The heating surface = 1006 × 81 = 81,486 sq. ft.
Heating surface per cu. ft. of free air per second = 81,486 ÷ 593 = 137.4 sq. ft.
Heating surface per cu. ft. at pressure and average temperature 81 486 ÷ 824 = 98.9 sq. ft.

The average heat transfer rate will be 18,180 ÷ 81,486 = 0.223 B.t.u. per sq. ft. per second for the differential existing.

The average velocity of flow of the air through the checker will be 824 ÷ 89.25 = 9.23 ft. per sec.

The frictional resistance in the checkers, by Mojarow's formula, will be 1.685 in. of water, while there will be a hydrostatic pressure upward of 0.355 in. of

TABLE 6

POINTS FOR HEAT CAPACITY CURVES. BRITISH THERMAL UNITS PER CUBIC FOOT; PRODUCTS OF COMBUSTION, AIR AND GAS VOLUMES

		Temperatures Centigrade Degrees								
Volume	200	400	600	800	1000	1200	1400	1600	1800
N_2	111.33	7.81	15.82	24.18	32.64	41.66	50.78	60.20	69.82	79.69
CO_2	36.91	3.43	7.41	11.99	17.38	23.07	28.92	35.66	42.97	50.58
H_2O	5.57	.50	1.91	1.66	2.32	3.07	3.88	4.80	5.69	6.70
100% Air		11.74	24.24	37.83	52.34	67.80	83.58	100.66	118.48	136.97
+20%	13.55	.96	1.91	2.92	3.98	5.09	6.20	7.30	8.51	9.72
120% Air		12.70	26.15	40.75	56.32	72.89	89.78	107.96	126.99	146.69
+40%	27.10	1.91	3.83	5.84	7.96	10.18	12.39	14.61	17.03	19.44
140% Air		13.65	28.07	43.67	60.30	77.98	95.97	115.27	135.51	156.41
+80%	54.20	3.83	7.66	11.69	15.92	20.35	24.78	29.22	34.05	38.89
180% Air		15.57	31.90	49.52	68.26	88.15	108.36	129.88	152.53	175.86
		Heat Capacity of the Air Supply								
100%	67.75	471	963	1,472	1,986					
120%	81.30	570	1,154	1,764	2,384					
140%	94.85	665	1,346	2,061	2,782					
180%	121.95	857	1,734	2,651	3,578					
		Per Cent Heat Capacity of the Gas								
N_2+	85.39	590	1,200	1,835	2,475					
CO_2	12.96	121	262	418	595					
H_2O	1.65	15	30	45	65					
	100.00	726	1,492	2,298	3,135					

N_2 57.13+O_2 0.39+H_2 3.92+CO 23.95=85.69 Per Cent.

Volume		B. t. u.	Products of Combustion			
			O_2	CO_2	H_2O	N_2
H_2	3.92×293.2	1,149	1.96	....	3.92	7.84
CO	23.95×343.6	8,229	11.98	23.95	....	47.92
O_2	0.39	.....	.....	.....	.....	.....
CO_2	12.96	.....	.....	12.96	.....	.....
H_2O	1.65	.....	.....	.....	1.65	.....
N_2	57.13	.....	.....	.....	.....	57.13
		9,378	13.94	36.91	5.57	112.89
			0.39			1.56
			13.55	36.91	5.57	111.33

TABLE 6A

AIR SUPPLY, OXYGEN REQUIRED AND PRODUCTS OF COMBUSTION OF THE USUAL COMBUSTIBLES

This table is based upon the assumption that air = one volume of oxygen O_2 + four volumes of nitrogen N_2. This assumption is sufficiently accurate for most purposes and greatly simplifies the work of computation. If greater accuracy is desired, use 3.8 volumes for N_2 and 4.8 volumes for air.

The volumes may be considered as cubic feet, cubic meters, ounce molecules or gram molecules as desired for the purpose in hand.

Substance Burnt One Volume	Molecular Formula	Molecular Weight	Oxygen Required O_2 For Hydrogen, H_2	Oxygen Required O_2 For Carbon, C	Oxygen Required O_2 Total	Nitrogen N_2	Air Required	Products of Complete Combustion with Air: Carb. Monoxide CO	Carb. Dioxide, CO_2	Water, H_2O	Nitrogen, N_2	Total
Hydrogen	H_2	2	0.5	....	0.5	2.0	2.5	....	....	1.0	2.0	3.0
Carbon* to CO	C	12	....	0.5	0.5	2.0	2.5	1.0	....	....	2.0	3.0
Carbon*	C	12	....	1.0	1.0	4.0	5.0	....	1.0	....	4.0	5.0
Carbon Monoxide	CO	28	....	0.5	0.5	2.0	2.5	....	1.0	....	2.0	3.0
Methane	CH_4	16	1.0	1.0	2.0	8.0	10.0	....	1.0	2.0	8.0	11.0
Acetylene	C_2H_2	26	0.5	2.0	2.5	10.0	12.5	....	2.0	1.0	10.0	13.0
Ethylene	C_2H_4	28	1.0	2.0	3.0	12.0	15.0	....	2.0	2.0	12.0	16.0
Ethane	C_2H_6	30	1.5	2.0	3.5	14.0	17.5	....	2.0	3.0	14.0	19.0
Benzene	C_6H_6	78	1.5	6.0	7.5	30.0	37.5	....	6.0	3.0	30.0	39.0
Sulphur	S	32	....	....	1.0	4.0	5.0	SO_2 1.0	....	....	4.0	5.0
Sulphur	S	32	....	....	1.5	6.0	7.5	SO_2 1.0	....	....	6.0	7.0

*Carbon may be considered as a gas or as a solid.

BLAST FURNACE GAS NO. 1. 93 B.T.U. PER CU. FT.

Composition Volumes		Volumetric Products of Complete Combustion: Per 100 Volumes of Gas — Air Supply in Percentage of Theoretical Requirements: 100	120	140	180	Centessumal or Percentage Values — Air Supply in Percentage of Theoretical Requirements: 100	120	140	180
H_2	3.92	.....	.....	.....	.....	.....	.....	.....	.....
CO	23.95	.....	.....	.....	.....	.....	.....	.....	.....
O_2	0.39	0.00	2.71	5.42	10.84	0.00	1.62	3.00	5.21
CO_2	12.96	36.91	36.91	36.91	36.91	24.00	22.05	20.40	17.74
H_2O	1.65	5.57	5.57	5.57	5.57	3.62	3.33	3.08	2.68
N_2	57.13	111.33	122.17	133.01	154.69	72.38	73.00	73.58	74.37
Totals		153.81	167.36	180.91	208.01	.....	.....	.....	.....
Air Supply		67.75	81.30	94.85	121.95	.....	.....	.....	.....

water, so that the drop through the checkers will be 1.33 in. of water.

In considering the possibility of higher blast temperatures, the limitation fixed in this increase will be due to the possible temperature which may be realized

TABLE 6B

COMPUTATION FOR CURVES SHOWING THE EFFECTS OF PREHEAT UPON CALORIC INTENSITY. VALUES FROM SHEETS 1 AND 2

Temperature of preheat, deg. Fahr.	0	360	720	1,080	1,440
B.t.u. released by gas at 32 deg. ..... (A)	9,378	...	...	...	...
Added to gas by preheat (B)	..	726	1,492	2,298	3,135
Preheated gas (A+B) (T)	..	10,104	10,870	11,676	12,513
Added by air preheat (100 per cent) ..... (C)	..	474	963	1,472	1,986
Preheated air (A+C) (D)	..	9,852	10,341	10,850	11,364
Preheated gas and air (D+B) ..... (T)	..	10,578	11,833	13,148	14,499
Added by air preheat (120 per cent) ..... (E)	..	570	1,154	1,764	2,384
Preheated air (A+E) (F)	..	9,948	10,532	11,142	11,762
Preheated gas and air (F+B) ..... (T)	..	10,674	12,024	13,440	14,897
Added by air preheat (140 per cent) ..... (G)	..	665	1,346	2,061	2,782
Preheated air (A+G) (H)	..	10,043	10,724	11,439	12,160
Preheated air and gas (H+B) ..... (T)	..	10,769	12,216	13,737	15,295
Added by air preheat (180 per cent) ..... (K)	..	857	1,734	2,651	3,578
Preheated air (A+K) (L)	..	10,235	11,112	12,029	12,956
Preheated air and gas (L+B) ..... (T)	..	10,961	12,604	14,327	16,091

The values marked *T*, *D*, *F*, *H*, *L* are spotted upon the heat capacity curves for their corresponding air supplies, and curves are drawn through these points, which enable certain approximations to be made in regard to other air supplies and temperatures of preheat.

TABLE 7

INSTANTANEOUS CALORIC INTENSITY OF BLAST FURNACE GAS WITH VARIOUS AIR SUPPLIES, SHOWING THE EFFECT OF PREHEAT OF BOTH THE AIR AND THE GAS (APPROXIMATE. READ FROM CURVE)

Temperature Deg. Fahr. Gas	Air	Air Supply in Per Cent of Theoretical Requirements: 100	120	140	180
32	32	2425	2265	2150	1920
32	400	2515	2390	2270	2085
400	32	2600	2425	2280	2140
400	400	2690	2535	2415	2210
32	750	2625	2500	2390	2235
750	32	2730	2570	2425	2190
750	750	2930	2785	2680	2600
32	1110	2715	2615	2535	2370
1110	32	2895	2730	2590	2335
1110	1110	3165	3045	2955	2775
32	1470	2820	2730	2660	2535
1470	32	3045	2875	2715	2445
1470	1470	3415	3315	3180	3000

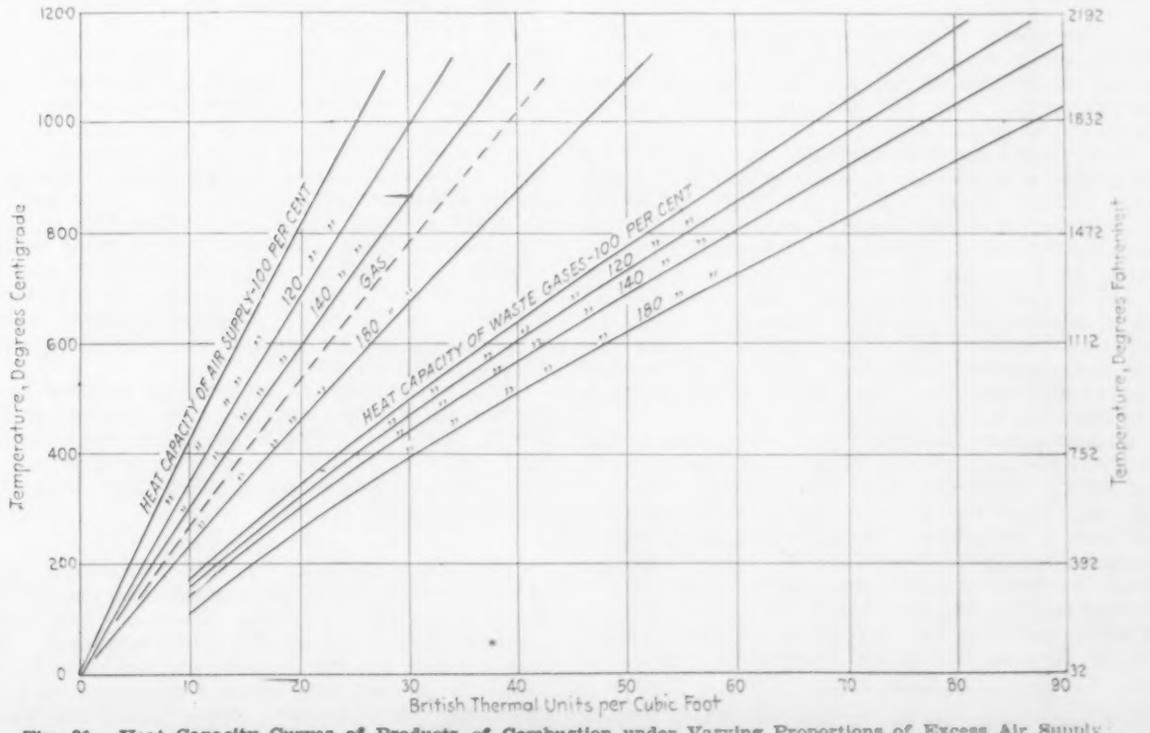


Fig. 21. Heat Capacity Curves of Products of Combustion under Varying Proportions of Excess Air Supply; Also of the Air Supply and Blast Furnace Gas

from the combustion of blast furnace gas. Mallard and Le Chattelier, in the course of their work for the Commission de Grisou, determined the heat capacity

TABLE 8

HEAT RELEASED BY THE COMBUSTION OF THE PRINCIPAL COMBUSTIBLES AT CONSTANT PRESSURE. WATER ASSUMED TO REMAIN AS VAPOR

Substance Burnt Unit Weight or Volume	Molecular Formula	Molecular Wt.	Reaction of Combustion Formula	B. t. u. Per Pound	B. t. u. Per Cu. Ft.	B. t. u. Per Ounce Molecule	Calories Per Gram Molecule
Hydrogen	H_2	2	$H_2+0.5\ O_2=H_2O$	52,384	293.2	6,548	58.2
Carbon to CO	C	12	$C+0.5\ O_2=CO$	4,411	148.1	3,308	29.4
Carbon	C	12	$C+O_2=CO_2$	14,640	491.7	10,980	97.6
Carbon Monoxide	CO	28	$CO+0.5\ O_2=CO_2$	4,366	343.6	7,673	68.2
Methane	CH_4	16	$CH_4+2O_2=CO_2+2H_2O$	21,961	983.4	21,961	195.2
Acetylene	C_2H_2	26	$C_2H_2+2.5O_2=2CO_2+H_2O$	21,108	1536.0	34,300	304.9
Ethylene	C_2H_4	28	$C_2H_4+3O_2=2CO_2+2H_2O$	20,545	1610.0	35,955	319.6
Ethane	C_2H_6	30	$C_2H_6+3.5O_2=2CO_2+3H_2O$	20,392	1812.5	38,241	339.9
Benzene (Gas)	C_6H_6	78	$C_6H_6+7.5O_2=6CO_2+3H_2O$	17,308	3779.2	84,380	750.2
Sulphur	S	32	$S+O_2=SO_2$	3,893	348.6	7,785	69.2
Sulphur	S	32	$S+1.5O_2=SO_3$	5,164	462.5	10,328	91.8

TABLE 9

HEAT CAPACITY IN B.T.U. OF GASES MEASURED FROM 32 DEG. FAHR. TO $t = T - 491$ PER CUBIC FOOT OF GAS

Temperature Deg. Fahr.	N_2=28 O_2=32 H_2= 2 CO=28	H_2O=18	CO_2=44	CH_4=16
32	0.00	0.00	0.00	0.00
392	7.00	8.71	9.32	11.03
752	14.21	18.59	20.1	24.43
1112	21.71	29.57	32.44	40.4
1472	29.32	41.46	45.7	57.7
1832	37.43	55.31	62.57	79.44
2192	45.59	69.87	78.33	102.6
2552	54.05	85.64	96.5	128.2
2912	62.77	102.5	116.4	156.1
3272	71.58	120.2	137.1	180.6
3632	80.85	139.8	160.4	219.4
3992	90.22	160.3	184.6	254.6
4352	99.94	181.9	210.4	292.3
4712	109.87	204.6	237.6	332.7
5072	120	229.9	266.2	374.9
5432	130.4	255.1	296.5	419.8

(Extracted from "Les Sources de L'Energie Calorifique," by Damour, Carnot and Rengade.)

NOTE.—As CH_4 and other hydrocarbons (C_nH_m) break up at low temperatures, around 1450 deg. Fahr, their heat capacity is valueless and such gases cannot be preheated successfully. Some data as to the dissociation of CH_4 and C_nH_m were given on page 1014 of THE IRON AGE, April 24, 1913.

of various gases. Working with this data, it is possible to approximate the instantaneous calorific intensity of combustion of various fuels under athermal chamber conditions, as well as the effect of preheating the air or the gas, or both.

Such a curve has been computed for a blast furnace gas having a volumetric composition of: $H_2 = 3.92$, $CO = 23.95$, $O_2 = 0.39$, $CO_2 = 12.96$, $H_2O = 1.65$ and $N_2 = 57.13$. This gas has a thermal value of 7384 B.t.u. per 100 molecular volumes (78.82 cu. ft.), equivalent to 93 B.t.u. per cubic foot. These curves, Figs. 20 and 21, show intersection points which may be read to approximate the temperature which may be realized from the combustion of this gas with various air supplies and preheating conditions. Table 6 is the computation made for the plotting of the curves, which it is believed are self-explanatory.

In making them, however, it has been assumed that the air is composed of one volume of O_2 and four volumes of N_2. While this is not absolutely accurate it is sufficiently close for the purpose, and saves considerable time in computing. Table 7 summarizes the instantaneous calorific intensities as read from the curves for different conditions. Tables 8 and 9 give the data used in the computations of Table 6, both being abstracted from Les Sources de L'Energie Calorifique by Damour, Carnot and Rengade.

The machinists union, Springfield, Mass., with a membership of about 2000, has voluntarily accepted a reduction of 12 per cent in wages.

Census of Brass, Bronze and Copper

WASHINGTON, June 14.—Brass, bronze and copper products of 1119 establishments were valued at $487,707,000 in 1919, as compared with a value of $162,199,000 for 992 establishments in 1914, according to a preliminary statement by the Census Bureau. The report is compiled from returns of establishments engaged primarily in the manufacture of all kinds of brass, bronze and copper products during 1919. The greatest item relates to castings and machinery fittings, with a value of $130,736,000 in 1919; ingots and bars were valued at $102,898,000.

Of the 1119 establishments reported, 213 were located in New York; 125 in Ohio; 122 in Pennsylvania; 88 in Illinois; 80 in Michigan; 75 in Connecticut; 72 in Massachusetts; 67 in New Jersey; 44 in California; 36 in Wisconsin; 31 in Indiana; 21 in Missouri; 20 in Maryland; 18 in Rhode Island; 16 in Washington; 10 in Minnesota; 9 each in Kentucky and Colorado; 7 in Texas; 6 each in Louisiana and New Hampshire; 5 each in Iowa and Maine; 4 each in Alabama, Delaware, Georgia and Oregon; 3 each in Nebraska and West Virginia; 2 each in Montana, Tennessee, Utah and Virginia; 1 each in the District of Columbia, Florida, Kansas and Vermont.

Comparative figures for 1919 and 1914 follow:

	1919	1914
Number of establishments	1,119	992
Value of products	$487,707,000	$162,199,000
Ingots and bars	30,490,000	4,792,000
Plates and sheets	102,898,000	41,655,000
Rods	40,705,000	12,189,000
Tubing: Seamless	37,531,000	10,269,000
Brazed	4,603,000	3,646,000
Wire: Plain	33,933,000	13,487,000
Insulated	3,694,000	846,000
Castings and machinery fittings	130,736,000	*5,288,000
Lamps	1,559,000	561,000
Electrical supplies	7,927,000	1,127,000
Other hardware and trimmings	38,396,000	1,524,000
Other manufactured products	15,400,000	19,430,000
All other products	33,961,000	47,385,000
Custom work and repairing	5,874,000	

*Includes aluminum castings only, in 1914.

It should be noted that unit costs of metal products in 1919 were far higher than in 1914—in the ratio of 161 to 87, according to analyses of the Bureau of Labor Statistics. Applying this ratio to 1919 production, the value, based on 1914 dollars, would be about $263,544,000. This shows an increase of 62.5 per cent, while the reported figures would give 200.6 per cent increase.

Output of Chromite in 1920

The outstanding features of the chromite industry in the United States during 1920 have been a further decrease in the production and a great increase in the imports, which were the largest yet recorded. Domestic chromite amounting to 2502 gross tons was sold in 1920, according to statistics compiled under the direction of Edward Sampson of the U. S. Geological Survey. Before the war the United States produced annually about 250 tons. By 1918 the output had risen to 82,430 tons, the largest ever recorded by any country. In 1919 it had fallen to 5079 tons. Only 19 mines shipped ore in 1920 as compared with 33 in 1919. Of these 19 mines 17 are in California, one is in Oregon and one is in Wyoming. Although California still led in production in 1920, her part was reduced from 64 to 57 per cent of the total.

Imports of chromite in 1920, as reported by the Bureau of Foreign and Domestic Commerce, were 150,275 tons. This quantity is 30 per cent more than that imported in 1916, the year of next largest imports, when they amounted to 115,945 tons. Only 61,404 tons was imported in 1919.

The Spang-Chalfant Co., Inc., Pittsburgh, maker of iron pipe and tubing, has re-established the old 10-hr. day at a straight hourly rate. Previously mill workers received overtime for all time after eight hours. More than a month ago the company reduced all employees' wages 20 per cent, and followed this reduction by establishing the 8-hr. day. After giving the shorter working day a trial, it was decided to abolish it. The men now work 10½ hrs. a day and 11 hrs. on night turn.

Milwaukee Sheet Mill Has New Features

New Type Roughing Mills and Sheet Bar Piler—Bar Storage and Shipping Department Are Under Roof

BY GILBERT L. LACHER

NOT only has the eight-hot-mill plant of the Milwaukee (Wis.) Rolling Mill Co. the distinction of being the only sheet mill in Wisconsin, but it embodies construction and equipment features that are novel and conducive to efficiency in operation. The mill structure affords a maximum of daylight to the workmen, as well as protection against heat and fumes, through numerous outside doors and special ventilating equipment. The bar yard and the shipping department are both under cover, and an overhead crane lifts finished material from shipping floor to outbound railroad cars and automobile trucks. Sheet bars are cut to length and piled mechanically, and an ingenious method of handling coal has been introduced.

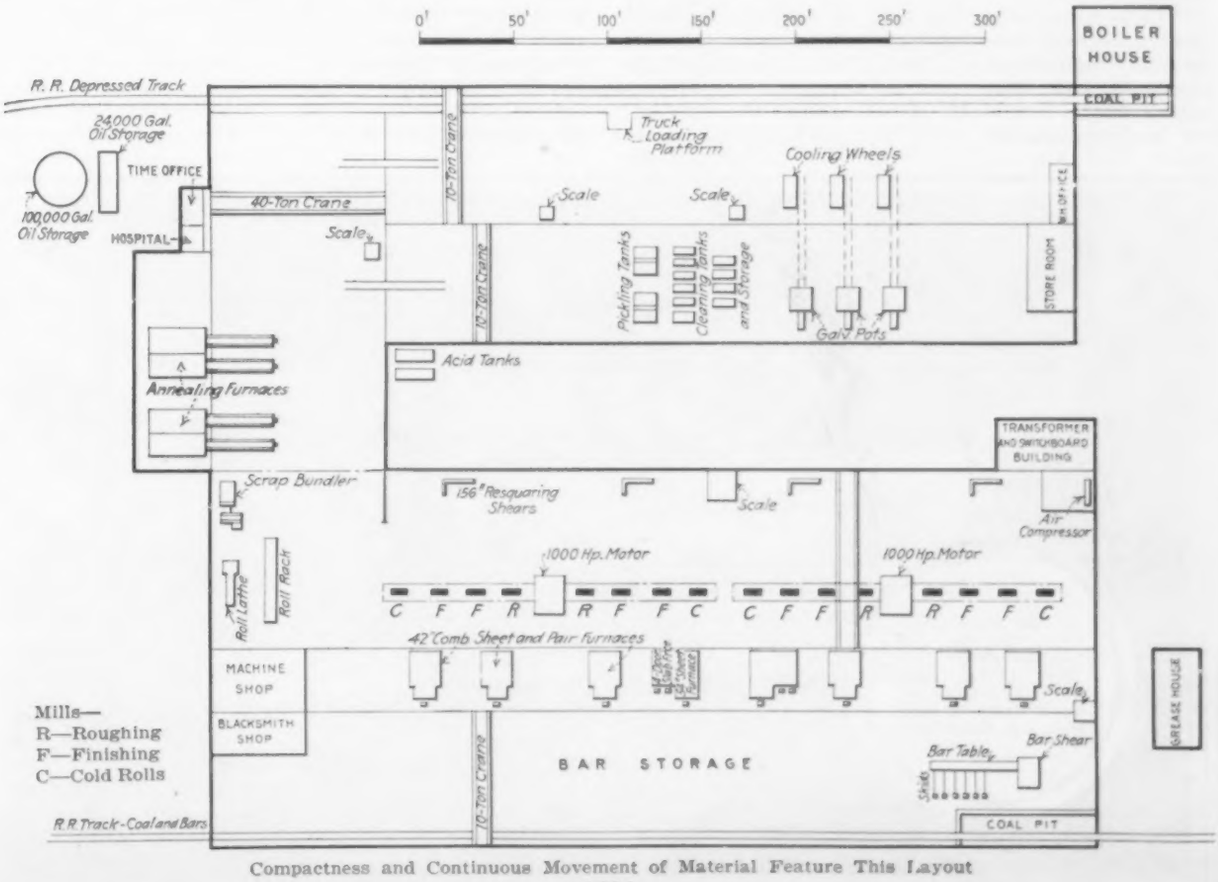
Because of the new method devised for driving the balanced rolls of the roughing stands, the mills command special attention. There are four roughing stands, two in each of the duplicate trains of four hot mills. Each train is driven at 30 r.p.m. through gears from a 1000-hp. induction motor, operating at 300 r.p.m. The two roughing mills in each train are arranged on either side of the motor. Next to each roughing mill are two finishing mills, while at each end of the train is a stand of cold rolls. Thus each half of the train is the converse of the other, embracing one roughing mill, two hot mills and one stand of cold rolls. The finishing mills are all standard interchangeable 28-in. Mesta installations. Rolls used include the following sizes: 28 x 32-in., 28 x 38-in., 28 x 44-in., and 28 x 56-in. Hence the mills will roll any desired size of sheet up to 50 in. wide.

To obviate the necessity of providing pinion drive for the top rolls of the roughing stands, which is not only expensive but tends to increase maintenance difficulties, Boyd B. Jack, general manager, and William Howard, master mechanic, of the Milwaukee comany, designed a drive by gears from the lower roll. The necks of the top roll are journaled in an inside block suspended from the outside housing by bolts playing in coil springs placed above the housing. A small motor operates the screw-down, moving the inside block. When the top roll, which normally rests on the lower roll, is raised by the screw-down the springs stretch, resisting any tendency of the upper roll to jump during operation. Thus the maximum pressure is exerted by the springs when it is most needed, namely, when the sheet bars are first fed to the mill.

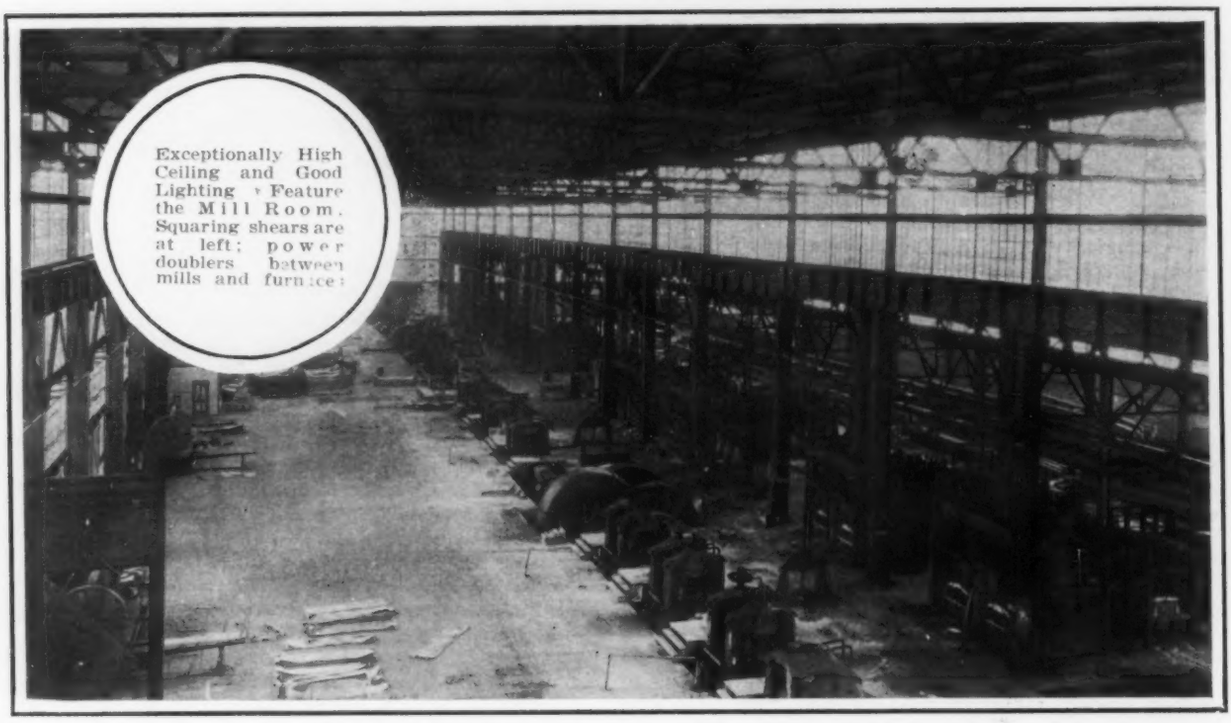
Power is transmitted to the top roll by a train of gears. A gear mounted on the neck of the top roll engages an idling gear, bearing in a side bracket, which in turn meshes with a second idler which engages a gear mounted on the neck of the lower roll. The bracket containing the idling set is securely bolted at one side of the outside housing, and is so placed that the upper gear meshes with the gear on the top roll, no matter to what position the latter is moved.

All of the housings are of cast steel, of new I-beam design, and weigh about 35,000 lb. The mills are so arranged that if trouble is encountered with one motor, the remaining motor may be connected with the train affected. At least six of the eight hot finishing mills can be pulled in this manner by the one motor.

Power is bought from the Milwaukee Electric Railway & Light Co. at 26,700 volts, and for use by the mill motors is stepped down by two 1250-kva. transformers to 2300 volts. Auxiliary transformers provide



Compactness and Continuous Movement of Material Feature This Layout



Exceptionally High Ceiling and Good Lighting Feature the Mill Room. Squaring shears are at left; power doublers between mills and furnace

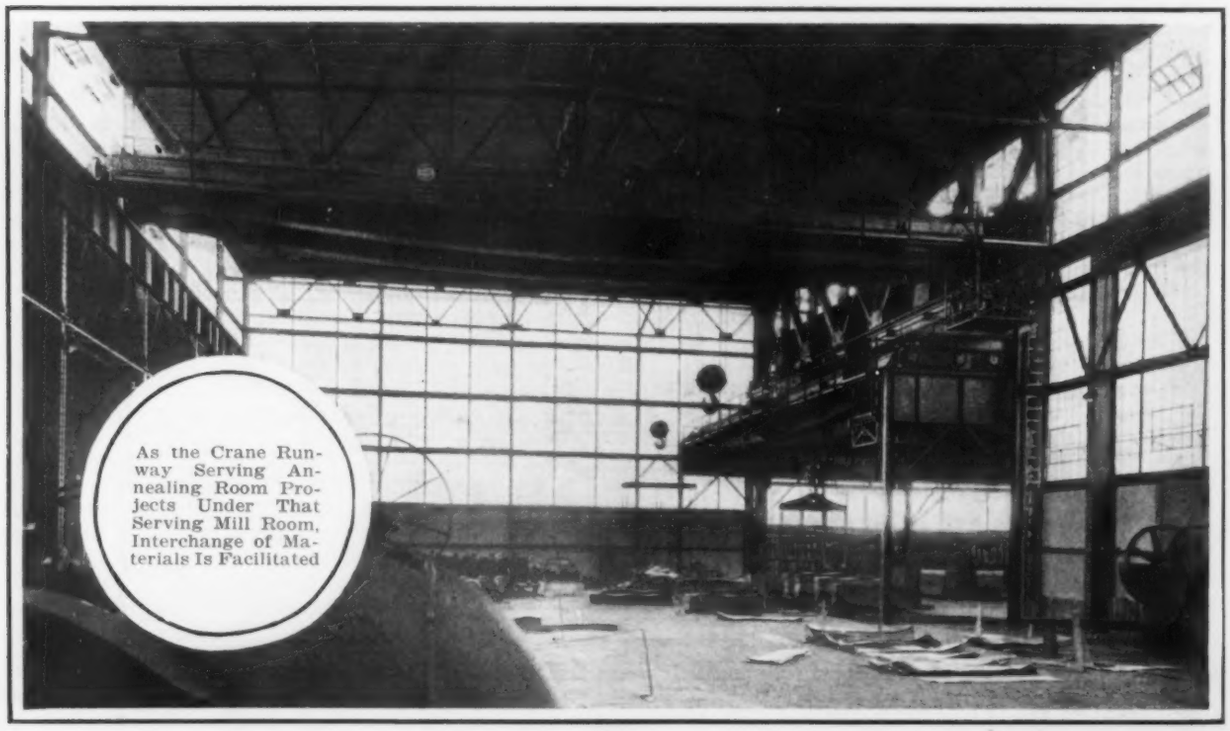
220-volt current for miscellaneous uses in the plant, while a 400-kva. rotary converter furnishes direct current at 250 volts to the motors operating the traveling cranes. All electrical equipment in the plant was supplied by the General Electric Co.

Each train of mills is served by three 42-in. door double-side combination sheet and pair furnaces and one single 54-in. sheet furnace with independent four-door pair furnace. All of these furnaces, constructed by the Geo. J. Hagan Co., Pittsburgh, are designed with double crowns to prevent direct contact of the flame with the bars and sheets. The doors are of the lift type and are operated by counterbalanced levers, the doors on the sheet furnace side being next to the mills, and those of the pair furnace side adjacent to the bar storage room.

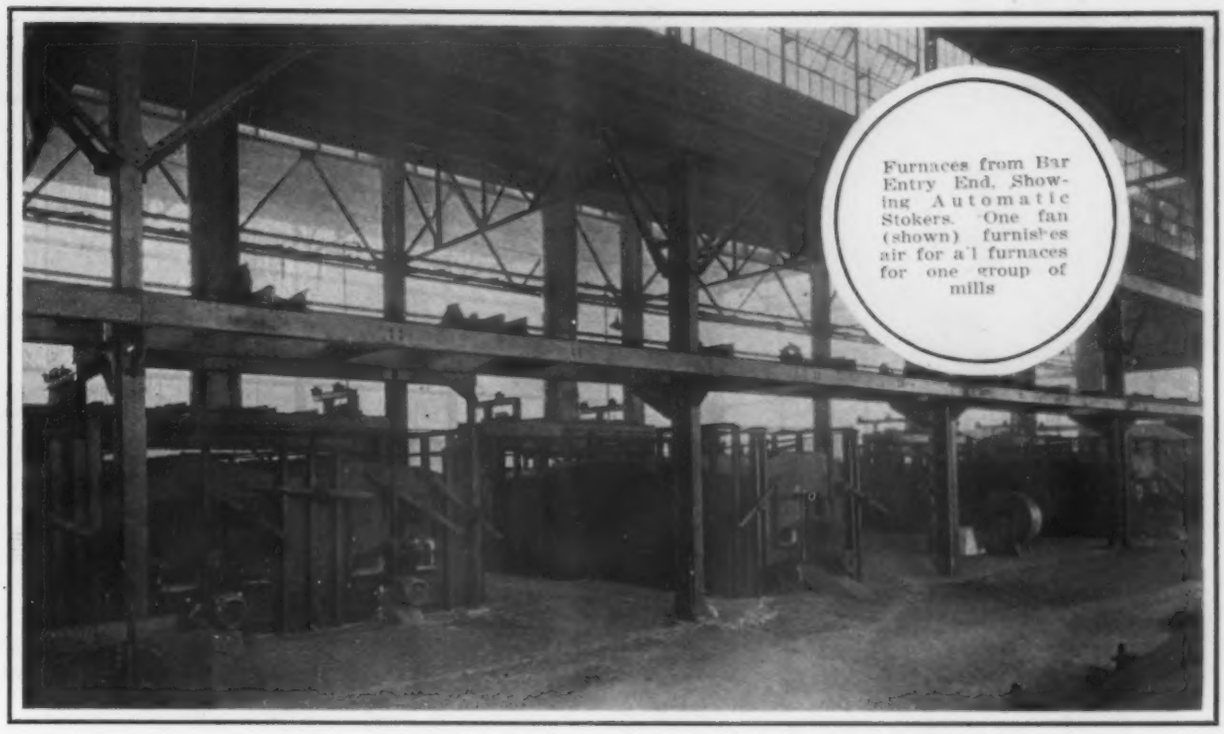
These furnaces are fed from coal hoppers by American underfeed screw-type stokers, made by the Combustion Engineering Co., New York. The stokers are equipped with steam jets to break up any clinkers which might form. All of the stokers for each unit of five furnaces are driven by a single 15-hp. motor from a line shaft, while the draft for each group of furnaces is supplied by a fan driven by another 15-hp. motor. Coal storage hoppers are now being constructed on a platform above the stokers so that coal may be passed by gravity to the stoker feed hoppers, thus eliminating shoveling.

Coal for use in the plant is dropped from railroad cars into a 600-ton concrete storage pit sunk into the floor in one corner of the bar storage room, the railroad switch track being on a level with the floor. The pit depth is 16 ft., while an adjacent concrete shaft is 20 ft. deep; doors connect the bottom of the storage pit with the shaft. When coal is to be moved to the furnaces, a drop bottom bucket is lowered by overhead crane into the shaft to a position immediately under one of the doors. Then the door is raised, permitting coal to pass by gravity into the bucket, and obviating hand labor.

A notable feature of the sheet bar storage lies in the fact that it is all under roof, and neither workmen nor materials are exposed to the weather. Bars to be cut are lowered by overhead crane to a skid table, from



As the Crane Runway Serving Annealing Room Projects Under That Serving Mill Room, Interchange of Materials Is Facilitated



Furnaces from Bar Entry End, Showing Automatic Stokers. One fan (shown) furnishes air for all furnaces for one group of mills

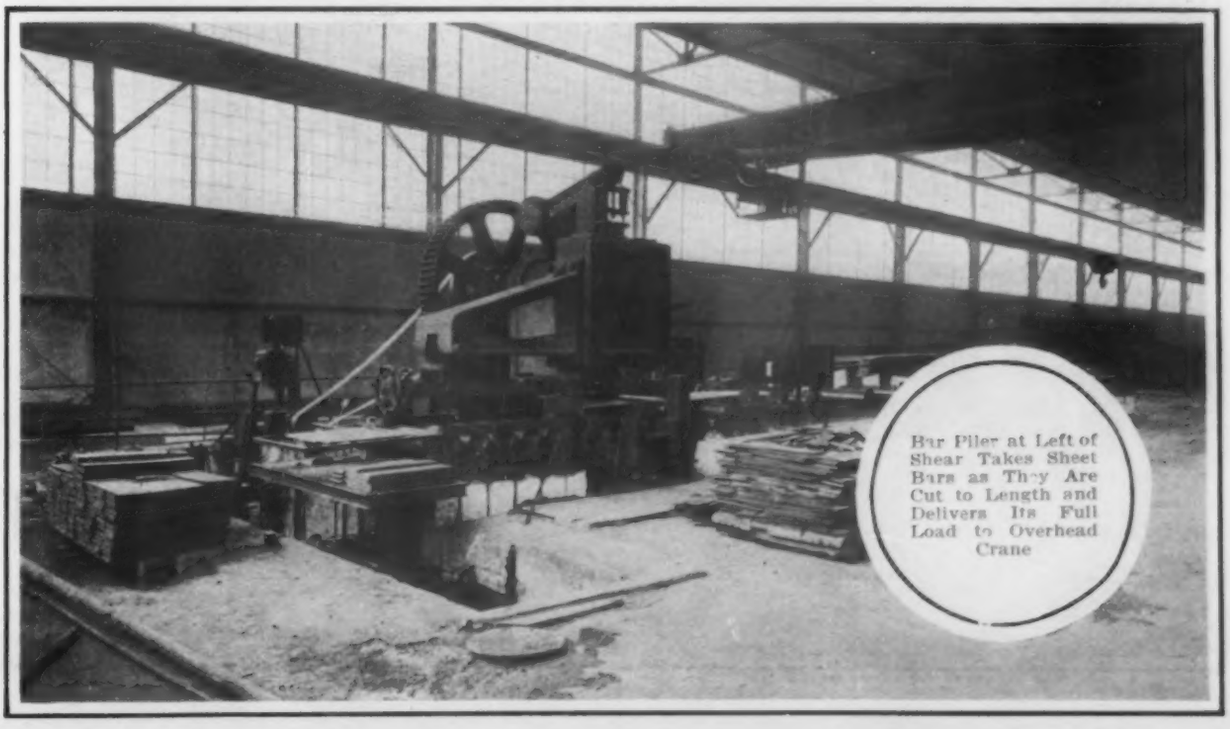
which four bars at a time are transferred to an adjacent 30-ft. roller table, whence they are moved forward in groups of four lying side by side, to a 15-ft. roller table serving the bar shear. The provision of two roller tables conserves the time of the workmen and prevents delay in the shear operation, as a new set of four sheet bars may be placed on the 30-ft. table as soon as 15 ft. of the previous set of bars has been cut.

The bar shear, built by the Birdsboro (Pa.) Steel Foundry & Machine Co., has a capacity to handle the requirements of 16 hot mills, and is driven by a 25-hp. motor. To eliminate hand labor in piling the bars as they are sheared, a mechanical piler was devised by Messrs. Jack and Howard. The roller table under the shear delivers the cut bars to a rack which overhangs a receiving table. A bar pusher, timed with the shear, inserts fingers between cross bars of the rack and brushes the four bars off onto the table.

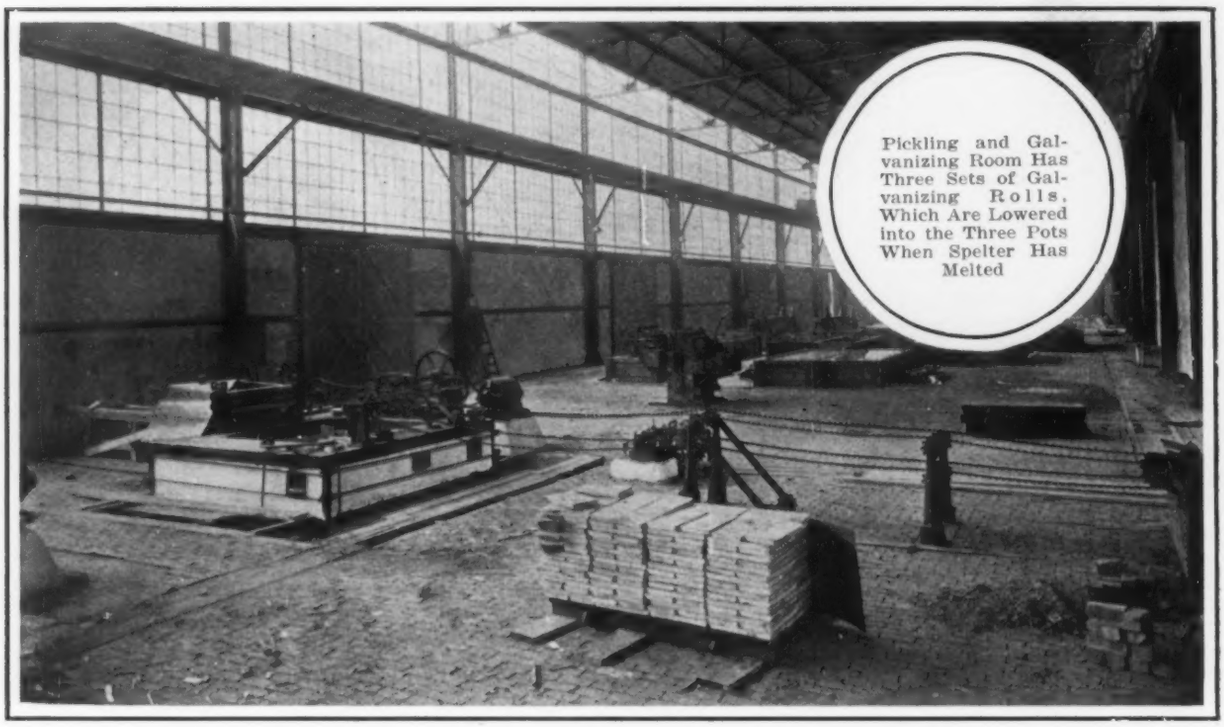
After each group of four bars has been dropped in a pile on the table, the latter is moved forward the width of a bar to receive the next pile of four bars. This operation is repeated until the bars are piled four deep across the table, whereupon the table is lowered and moved back to its original position to receive another layer. Piling in this manner is continued until the table can be lowered no further, when a clam shell hook is lowered by overhead crane and the bars are conveyed to the pair furnaces. The bar piler is sunk in a pit to permit it to operate underneath the delivery rack of the shear.

The bar pusher and the rack and pinion which move the table to and fro are driven by a 2½-hp. motor, while the screw which elevates and lowers the table is actuated by a ½-hp. motor. The clam shell sheet bar carrier is of standard design but of somewhat heavier construction than usual. The bar piler, by handling four sheet bars simultaneously, saves the labor of six catchers, as it is usual to employ four catchers with a turnover of two, as four men cannot stand the physical strain of handling bars continuously.

Four 156-in. squaring shears, also supplied by the Birdsboro Steel Foundry & Machine Co., are located in the mill room at convenient intervals back of the finishing mills. Each shear is driven by a 15-hp. motor. Four doublers, located between the mills and the fur-



Bar Piler at Left of Shear Takes Sheet Bars as They Are Cut to Length and Delivers Its Full Load to Overhead Crane



Pickling and Galvanizing Room Has Three Sets of Galvanizing Rolls, Which Are Lowered into the Three Pots When Spelter Has Melted

naces, are run by compressed air, instead of the usual steam.

An Ingersoll-Rand compressor, driven by a 50-hp. motor, delivers 900 cu. ft. of air per min. at 100-lb. pressure. The air pressure is automatically controlled so that it requires practically no attention.

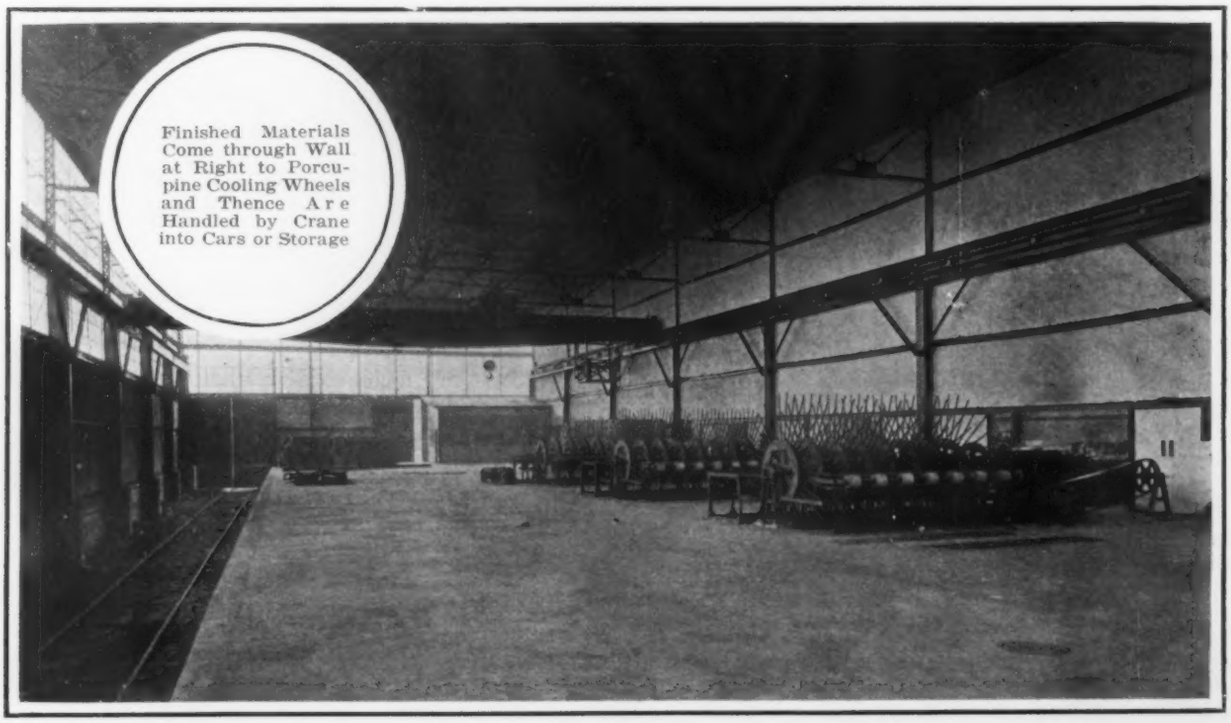
Compressed air is also used to unload oil and acid from storage tanks. There are two oil storage tanks, of 100,000 gal. and 30,000 gal. capacity; while there are two acid tanks, of 40,000 lb. capacity each, in the open bay.

A half dozen compressed air pumps are located in various parts of the plant to syphon out any storm water which might accumulate. Practically the only uses to which steam is put are in the steam jets in the furnaces, in the hot mills for cooling the rolls and in the pickling department for heating purposes. Steam for these uses is supplied by two Erie City Iron Works 125-hp. boilers.

To insure a maximum of light and ventilation, the ceiling of the mill room is 65 ft. above the floor, an unusual height for a sheet mill. The walls on the ends and on the side next to the open bay are entirely of continuous sash, above the 12 ft. of concrete wall next to the floor. Double sliding doors, 12 x 12-ft., and spaced every 25 ft. in the wall next to the open bay, may be opened when the temperature of the room rises. The roof of the mill building extends 20 ft. above the roof of the leanto in which the pair and sheet furnaces are located, and continuous sash has been provided on that side of the room also.

The mill room is served by a 40-ton Milwaukee traveling crane with 15-ton auxiliary hoist, on a runway 36 ft. above the floor. As the crane runway serving the annealing department, and connecting with the mill room at right angles at one end, is but 26 ft. above the floor, the former overhangs the latter, which facilitates the movement of material from one bay to the other.

To handle all the sheet trimmings and scrap produced by the eight hot mills, an hydraulic baler has been provided by the Galland-Henning Mfg. Co.,

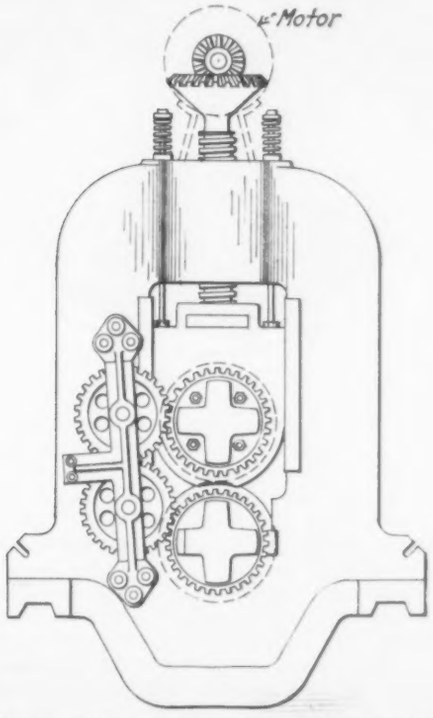


Finished Materials Come through Wall at Right to Porcupine Cooling Wheels and Thence Are Handled by Crane into Cars or Storage

Milwaukee. It consists of a rectangular box which is piled full of scrap, whereupon a cover is slid over the top from the rear. One end and a portion of the bottom of the box are formed by plates attached to hydraulic rams. An hydraulic pressure of 1300 lb. per sq. in. is applied to the ram attached to the end of the box and the scrap is compressed horizontally. When the stroke of this ram has been completed, an hydraulic pressure of greater intensity actuates the ram attached to the bottom of the box, compressing the scrap vertically. After the pressure has been released, the lid of the box is pulled back, and the ram raises the bale level with the top of the press. The lid is then moved forward, pushing the bale in front of the press. This machine can be operated by two workmen.

Two Geo. J. Hagan Co. double four-box oil-fired annealing furnaces are installed, with stoker equipment for emergency coal firing. The annealing boxes, of cast-steel, were made by the Hubbard Steel Foundry Co., East Chicago, Ind.

A short industrial track connects the annealing room with the pickling and galvanizing department, which is parallel with the mill room and is separated from it by a 66-ft. open bay. The pickling and galvanizing room is provided with the same excellent means of ventilation as the mill room. The roof was



Arrangement of Gear-Drive Between Hot Rolls, and of Motor Screw-Down

purposely slanted, projecting a few feet above the edge of the roof of the shipping building adjacent, so that a strip of continuous sash could be built in on that side of the room also. As a further precaution to insure ventilation and the drawing off of fumes generated in the room, 14 Alpine ventilators, made by the Milwaukee Corrugating Co., were placed in the roof. These are constructed so that they are always headed to the wind.

Besides several acid and water vats, the room contains three galvanizing pots and three sets of galvanizing rolls, the latter being lowered into the pots when the metal has been melted. The galvanizing equipment was designed in part by the Erie Foundry Co., Erie, Pa., and in part by James Neish, superintendent of the department. The furnaces for heating the galvanizing pots, arranged for either oil or gas, were designed and built by the General Combustion Co., Chicago. Special cleansing vats have been provided, into which the sheets are dipped after galvanizing, to insure freedom from flux spots. The sheets are then carried by chain conveyors to porcupine cooling wheels, three of which, made by the Erie Foundry Co., are located in the shipping room adjacent.

The shipping department, entirely under cover, is served by an overhead traveling crane. A depressed railroad track runs the length of one side of the room, also passing through the end of the annealing department. In the middle of the long outside wall of the room is a door admitting auto trucks for loading.

Handling of sheets for shipment is done entirely by overhead traveling crane instead of by the usual method of industrial trucks. A clamshell carrier, lowered by the crane, hoists the cooled sheets, deposits them on an automatic scale for weighing and then conveys them to railroad cars or automobile trucks. There are two 10-ton automatic Toledo scales in the warehouse, while three Fairbanks scales, also of 10 tons capacity, are respectively in the mill room, the annealing department, and the bar yard.

Dimensions of the main departments follow: bar storage, 70 x 460 ft.; sheet and pair furnace leanto, 45 x 460 ft.; mill room, 90 x 460 ft.; annealing department proper, 90 x 201 ft.; annealing furnace room, 40 x 112 ft.; pickling and galvanizing department, 65 x 350 ft.; warehouse and shipping room, 70 x 350 ft.; boiler house, 40 x 50 ft. The ceilings are all approximately 35 ft. in height, except the 65 ft. of the mill room.

In addition to the principal plant departments mentioned there are a small machine shop, a first aid room and an employment office. At convenient points throughout the plant circular concrete combination wash basins and drinking fountains have been placed. Water is pumped from an 1800-ft. well.

All of the five traveling cranes were built by the Milwaukee Electric Crane & Mfg. Co. In the mill room is a 40-ton crane with a 15-ton auxiliary hoist; in the annealing department a 40-ton machine; in the bar storage, galvanizing room and shipping room, a 10-ton crane each.

The mill building structure is of U-shape, arranged to permit an uninterrupted movement of material from bar yard to shipping room, the sequence being bar yard to pair and sheet furnaces, to mills, to annealing department, to galvanizing room and warehouse.

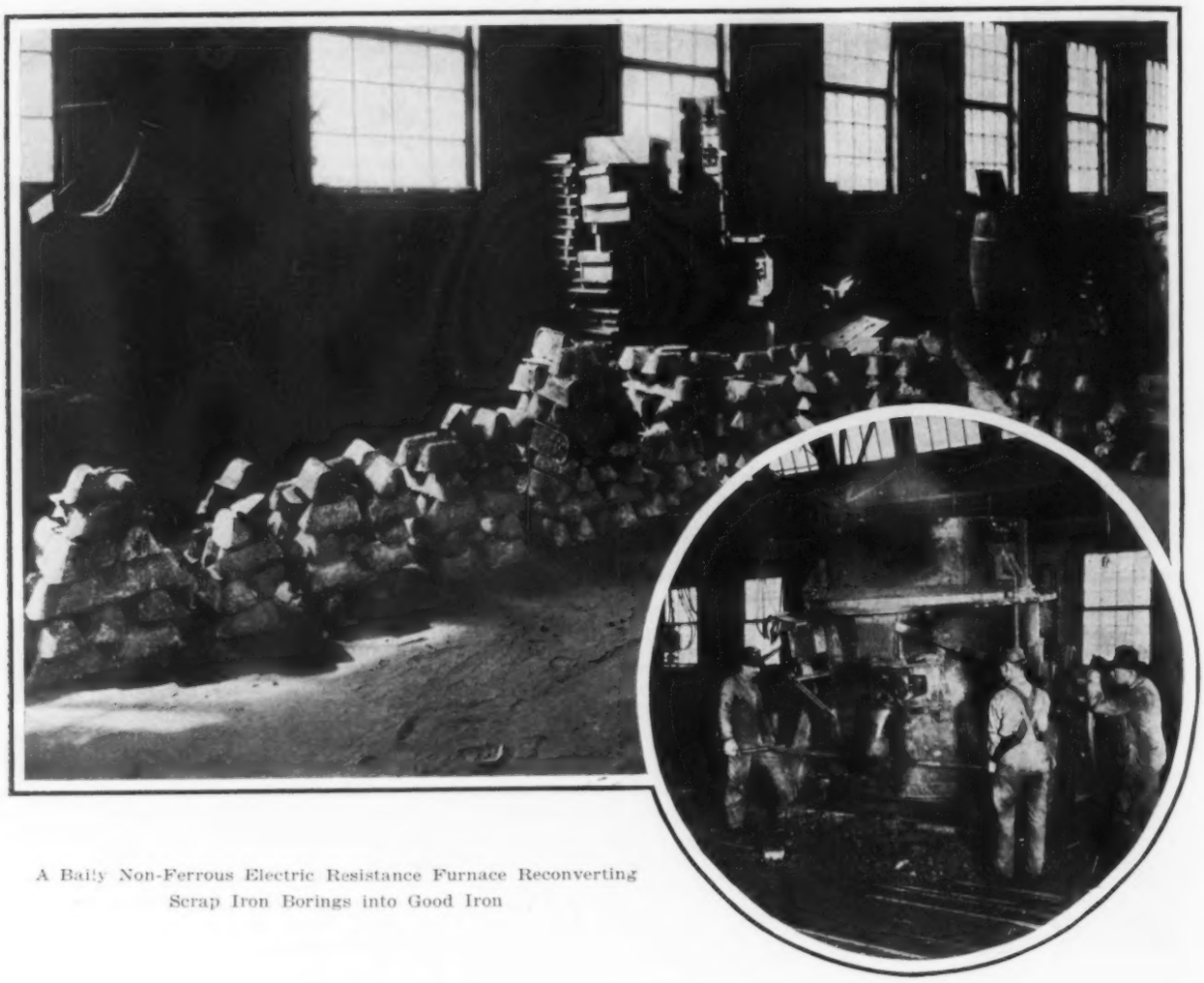
Except for the continuous sash, the walls of the building are of special "Ecod" concrete plaster construction, patented by the E. Coddington Co., Milwaukee. These walls are only 1¼-in. thick, one side being constructed of 2½-in. wire mesh on ¼-in. rods and the other side being lined with waterproof paper. On both sides a final coating of prepared cement plaster is placed. These walls are said to be not only waterproof but also heat insulators.

The plant is on a tract of 58 acres and has railroad connections with the Chicago & North Western Railroad and the Milwaukee Belt Line. The buildings were constructed by the Northwestern Bridge & Iron Co., Milwaukee. Construction work was begun March 22, 1920, and mill operations were started April 19, 1921.

"What Is Wrong With Cost Accounting?" a paper by G. Charter Harrison, occupies the June issue of the official publication of the National Association of Cost Accountants, 130 West Forty-second Street, New York. According to the writer, "the basic trouble with cost accounting is that it is masquerading as a science whereas in fact it has no claim to be considered scientific in the slightest degree." Again, "the troubles of the cost accountant to-day are due to the fact that he has no scientific foundation on which to build; he is a historian, not a scientist."

The Standard Steel Car Co. works at Butler, Pa., has delivered to the Pittsburgh Railways Co., 25 new trolley cars. It is said these cars cost $360,000, or about $14,400 each, the highest price paid for trolley cars for many years. The cars are equipped with Westinghouse electric apparatus and airbrakes, and are an improved type of the low-body, double-truck cars.

The National Implement and Vehicle Association will hold its twenty-eighth annual convention at the Congress Hotel, Chicago, from Oct. 12 to 14 inclusive. Hon. Henry C. Wallace, secretary of agriculture, will be one of the speakers.



A Baily Non-Ferrous Electric Resistance Furnace Reconverting Scrap Iron Borings into Good Iron

MELTING CAST IRON SCRAP

Converting Borings Into New Metal in a Non-Ferrous Electric Furnace

An application of the non-ferrous electric melting furnace to a new field seems assured, according to the experience reported by the Electric Furnace Co., Alliance, Ohio, which furnishes the following facts regarding a very recent investigation in their own laboratories on a Baily furnace. It is the result of a test record run at the Salem, Ohio, plant of the company and involves the melting of either cast iron scrap or cast iron borings in a resistance type of furnace. This furnace has thus far been employed only on copper, brass or other non-ferrous metals or alloys.

The furnace used was one of the standard 105-kw. Baily electric melting furnaces. In furnaces especially designed for cast iron melting, this unit is provided with 150 kw. in electrical capacity. For this test, a clay hearth was provided and the standard resistor troughs were used, and also the usual tilting gear. The diameter of this furnace is 7 ft. and its maximum capacity one ton of metal.

The results are tabulated in the table which gives the variations in chemical analysis when holding the cast iron molten in the furnace for 24 hr. without any slag. The illustrations show the pouring of the molten cast iron and an accumulation of pig iron, cast from remelted scrap.

It is to be noted that by the use of furnaces of this type not only is a smaller foundry floor required, as the charging and drawing of metal can be done almost continuously, but borings, which heretofore could not be handled readily otherwise, can be economically melted. In the average machine shop foundry there is al-

Table of Results of the Test Runs on Melting Scrap Iron in a Baily Furnace

Material	Start P.M.		Samples Taken	Per Cent Silicon	Sulphur	Comb. Carbon	Graphite	Phos.	Mang.	Kw. Hr. Used
1500 lb. pig iron	1:20	1	Before melting (Analysis of material charged)	2.21	0.021	0.76	3.21	0.604	0.59	..
		2		2.19	0.021	0.76	3.18	0.607	0.65	..
		3		2.21	0.021	0.76	...	...	...	..
	4:20	4	.....	2.20	0.026	0.55	3.03	0.59	0.65	318
	4:45	5	.....	2.23	0.026	0.55	3.01	0.60	0.65	51
	5:18	6	.....	2.22	0.025	0.55	3.03	0.60	0.65	64
	7:30	7	Pouring temperature. (Analysis of molten material)	2.18	0.026	0.55	3.07	0.60	0.65	224
	11:30 A.M.	8	.....	2.25	0.032	0.55	3.13	0.60	0.65	320
	9:30	9	Held at pouring temperature for 4 hr.....	2.23	0.032	0.55	2.98	0.68	0.63	606
317 lb. cast-iron borings	9:45	..	.....	...	.....	...	...	...	...	22
	10:35	10	Borings melted. (Analysis after adding borings)..	2.15	0.041	0.55	2.74	0.58	0.60	64
325 lb. cast-iron borings	10:45	..	.....	...	.....	...	...	...	...	28
	11:15	11	(Analysis after holding at temperature for 24 hr.)	2.11	0.047	0.55	2.60	0.59	0.60	50

To melt 1500 lb. pig iron..... 318 kw. hr.
To melt one ton..... 424 kw. hr.
To melt one ton of borings..... 526 kw. hr.

ways a considerable quantity of borings available, which must be stored for the time being and later sold at a very low price, oftentimes for an amount scarcely enough to pay for the freight involved. Melted in this way these borings can have almost the value of new metal. In a similar way but to a lesser extent, scrap metal can be repeatedly remelted without the addition of fresh pig iron, for in the electric furnace there is no increase in sulphur which is not the case with cupola.

THE FATIGUE OF STEEL

Progress Made in Research and in An Explanation of the Causes

At the important symposium on drill steels, held at the February meeting of the American Institute of Mining and Metallurgical Engineers in New York, Prof. H. F. Moore, University of Illinois, Urbana, Ill., extemporaneously offered an impressive brief discussion of the fatigue phase of the drill steel breakage problem. His remarks have finally been put in printed form by the institute and are reproduced as follows because of the light they throw on the general problem of the fatigue of steel, coming from the leading authority on the subject:

At present, I am connected with an investigation of the so-called fatigue of metals under stress. So far we have studied the more fundamental and simple case of the repeated stress. without the additional complexity of impact, which might bring in other factors. We feel that this investigation, which has been in active progress for a little over a year, has shown more conclusively than has been shown before that steel, under repeated applications of stress, reversed from positive to negative, will not fail below some fairly clearly defined limiting stress which, so far as we can see, does not bear any definite relation to the ordinary elastic limit, being as large as the elastic limit in some cases and about one-half the elastic limit in others.

I might be asked, first, what is fatigue. The old view summed up in the word "crystallization." The idea was that under repeated stress the material changed its crystalline structure. I do not know of any evidence in favor of the theory that metals materially change their crystalline structure under repeated stress. The crystals are broken under repeated stress.

The second theory, advanced by Bauschinger, the German scientist, is that under repeated stress some inherent property of the material changes its elastic limit; it is an inherent property of the material, possibly some property of the amorphous cement between the crystal. The third view is that all fatigue of metals is the result of the spread of damage from little localized overstresses.

I do not feel justified in stating my positive belief in the third view as against the second, but I have yet to run across a case of failure of steel or other metal, either in the laboratory or in service, that could not be explained by the gradual spread of damage from some nucleus.

We have found, for example, that it is possible to subject a homogeneous steel, like Armco iron or a 0.90 per cent carbon steel, that has been thoroughly annealed, to one hundred million reversals of stress as high as the elastic limit of the steel with no sign of failure.

We stopped the test at one hundred million because the machines were required for other work. Forty-five days, continuous running at 1500 revolutions a minute, is required to produce one hundred million repetitions. On the other hand, a complex structured steel, like a chrome-nickel steel that has been hardened with very little drawing, will fail at a stress about 58 per cent of its elastic limit. Between these two we are getting a variety of results. I do not say that I advocate Armco iron for work like drilling rock. Of course, the Armco iron will withstand only a very low stress anyhow. Such minute things as little differences in surface conditions materially affect results under repeated stress; in fact, the little incipient failure, one perhaps that cannot be seen, may be the determining factor in fatigue.

In the steel work of any building, there are undoubtedly many thousands of places where structural damage was done—where riveted members were bent into place cold and where the rivets were fitted with drift pins, and things of that kind. Locally the steel in the building was stressed beyond its yield point in many places. These little localized overstresses do no damage at all; the building is entirely safe. But if this building were subjected eight or ten times a day to a mild earthquake, these little localized overstresses might be nuclei from which damage would spread and eventually we would have trouble. That is, these little localized overstresses may not be important if the structure is loaded a few times, but they may be of importance if the structure is loaded many thousands of times.

The existence of localized stress has been demonstrated by direct experimentation with delicate extensometers by the elaborate investigations of the British scientist, Coker. Localized stresses four, five and six times those that we would get by the ordinary laws of mechanics exist in most of our structures. These stresses, ordinarily, under steady load do no damage but if they are repeated many times may start progressive failure.

So far we have seen no failure that could not be explained by localized high stress, at a nick, a crack, at a point where one heat treatment stopped and another began, or where there was local faulting due to that fact, possibly due to a place where there was local blue brittleness—or any one of a dozen causes. Certainly in the case of drill rods the actual distribution of stress must be different from that which any mathematical analysis could predict. It would seem that the spread of damage from the localized overstresses, so far as we can see now, explains the phenomenon known as fatigue.

Purchasing Agents of Bridgeport Organize

A buyers' club, a branch of the Manufacturers' Association of Bridgeport, Conn., has been organized by purchasing agents to study buying and related subjects. Expected benefits of such organization are: Closer co-operation between management and purchasing agents, collective buying, the establishment of an index catalog of articles manufactured in Bridgeport, a better acquaintance between purchasing agents, educational programs, etc. The next meeting will be held at the Stratfield Hotel on July 7, one speaker to represent management; the other, the purchasing agents.

A constitution has been adopted and officers elected as follows: President, H. M. Morrison, Bridgeport Brass Co.; vice-president, W. A. Lank, Harvey Hubbell, Inc.; treasurer, C. J. Ketcham, Jenkins Brothers. Other members of the executive committee are: W. R. Stroud, Manning, Maxwell & Moore, Inc.; F. J. Mullaney, International Silver Co.; J. E. Forgy, Locomobile Co.; E. E. Dunning, General Electric Co.; and H. F. DeLacour, Bullard Machine Tool Co.

The Nash Motors Co., four cylinder car division, Milwaukee, has recalled its force of about 800 men, as of July 5, for a resumption of normal production, which was intermitted, June 1 because of the decline in orders which resulted in a heavy accumulation of finished cars now virtually disposed of. B. W. Twyman is general manager of the Milwaukee division.

Luria Bros. & Co., Lebanon, Pa., iron and steel scrap, will soon open a new 10-acre yard on the north side of Pittsburgh, which will be fully equipped with locomotive cranes, shears and track. The property adjoins the Baltimore & Ohio tracks. A. Bowman, formerly in charge of the Lebanon yard of Luria Bros. & Co., will take charge of the new yard.

Developments in B. & S. Small Tools

The Brown & Sharpe Mfg. Co., Providence, R. I., are placing on the market a new micrometer depth gage known as the No. 607. Coincident with this, improvements are announced in several small tools previously offered.

The new micrometer depth gage is furnished with three measuring rods, as shown in the accompanying illustration. It enables readings from 0 to 3 in., to be obtained by thousandths of an inch, the micrometer screw having a movement of 1 in. The desired rod is placed in position by removing the cap, which permits the rod in the gage to be withdrawn and the one desired inserted. Replacing the cap brings the shoulder on the rod against the finished seat and the shoulders are adjustable permitting individual adjustment of any rod. Adjustment for wear on the threads is the same as on the regular line of micrometer calipers. Two sizes of base are furnished, 2½ and 4 in.

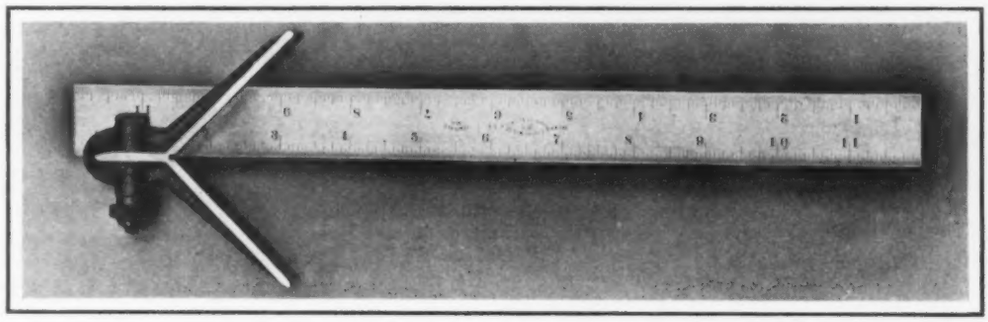
A new vernier height gage, No. 585, is also announced. The base is proportioned to give rigidity without undue weight and extended beyond the back of the bar to give additional stability. It is made in two sizes, the 10 in. size being furnished in either English or metric measure to take inside or outside measurements and is also made as a combination gage with English on the front and metric on the back. The 18 in. gage takes measurements outside the jaws. The bar is graduated to read by means of a Vernier, to thousandths of an inch or fiftieths of a millimeter, as the case may be. The graduations in each case are carried far enough along the bar to allow measurements to the full rated capacity being made. The readings are direct.

Vernier calipers Nos. 570 and 571, in either English or metric measures, are now made to read direct, i.e., outside measurements are taken from a vernier on one side of the bar and inside measurements from the other side. No additions or deductions are required.

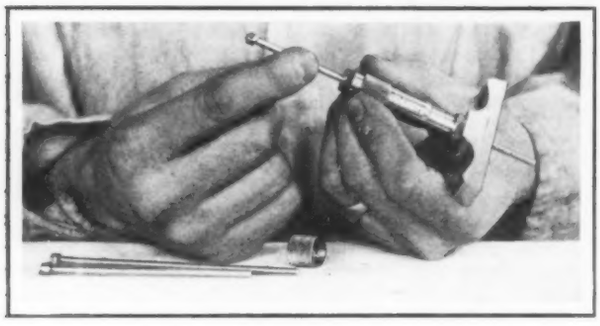
An improvement has been incorporated in the Brown & Sharpe combination squares and sets furnished with the center head. The center heads are now ground so that both arms are of equal length, permitting the use of the center heads with work of large diameter, allowing of much greater capacity.

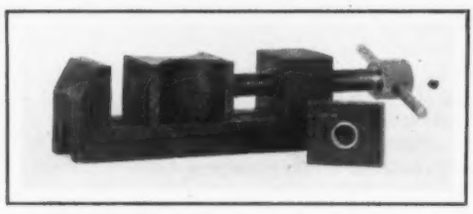
A new thickness gage, No. 644, with blades longer than formerly has been added to the line. This gage consists of nine blades 3 in. long by ½ in. wide, 0.0015, 0.002, 0.003, 0.004, 0.006, 0.008, 0.010, 0.012, and 0.015 in. in thickness.

Another addition to the line consists the No. 752 vise, shown in the accompanying illustration which is for use in drilling, fitting and laying out work on surface plates. It is case hardened and the base is ground The large jaw is provided with a tongue which slides in groove in the base and which is held in place by a strap. This feature enables the vise to hold the work firmly and prevents the jaw from lifting. The strap can be removed and by using the jaw upside down, taper pieces can be held. The greatest capacity is 2 in., and the V groove in the underside of the base takes work from 9/32 in. to 11/16 in. in diameter. The No. 753 toolmakers vise clamp is now carried in stock and is similar to the No. 752 but is not provided with the groove in the base or tongue on the jaw and corresponding slot.



Center Heads Have Arms of Equal Length, Permitting Their Use with Work of Large Diameter





The Micrometer Depth Gage Is Furnished with Three Rods. The desired rod is placed in position by removing cap, as shown at the left. The new vise is shown above

Aluminum To Be Made in India

WASHINGTON, June 21.—A plan is under consideration, reports Special Trade Commissioner Batchelder, for the construction of a plant on the western coast of India to produce about 2500 tons annually of aluminum from bauxite by the use of electricity. It is proposed to generate about 20,000 kw. by the construction of a large reservoir to collect and store the annual rainfall and the flow of a small stream, with a head of about 1700 ft. Considerable quantities of aluminum, it is stated, are being imported for the manufacture of cooking and other utensils and it is thought that there will be a good market for the product and demand for many surplus power generated.

Settling Chicago Building Dispute

CHICAGO, June 18.—The appointment of Judge Kenesaw M. Landis as umpire in the local building trades dispute had the immediate effect of bringing about a resumption of construction work in this city. It was first thought that Judge Landis would hand down a decision on wages within a day or two, but he has found it impossible to do this without first settling disputes as to working rules and conditions. He has therefore ordered building contractors and unions to begin the negotiation of working agreements and to submit all disputed matters to him on June 23, for final decision.

The first electric steel furnace to be installed in South Wales has just been started at the works of A. Hamilton & Sons, Ltd., Bute Docks, Cardiff, and will be employed in the production of steel castings. It is a Greaves-Etchells type furnace of 10-cwt. capacity.

SMELTING AND REFINING

Census of Copper, Lead and Zinc Manufacturing

Figures of the Census Bureau have been issued showing the number of establishments and value of output of smelting and refining plants in the copper, lead and zinc industries. The figures for output in dollars are, of course, based in 1919 upon prices approximately 40 per cent above the unit prices prevailing in 1914. This fact should be considered in studying the figures.

From the table it will be noted that the copper industry has had a steady, consistent increase in value of output during the past 20 years, the reported value for 1919 being nearly four times that for 1899. Contrasting with this, the (dollars) output of the lead industry has remained practically stationary throughout the whole range under review. As a matter of fact, while the production in dollars increased from 1914 to 1919, the tonnage of lead smelted showed an actual decrease of about 14 per cent.

Zinc shows a steady, uninterrupted growth throughout the period. The reported output in dollars for 1919 was between five and six times the output for 1899. Even after allowing for the differences in unit prices, the output of 1919 was nearly four times that of 1899, as shown by the tonnage figures.

Concentration of more than one-third of the output of refined copper in the state of New Jersey is the only noteworthy feature of this character in the reports. The total number of establishments producing copper has decreased continuously, from 47 in 1899 to 33 in 1919, through combinations of works.

	1919	1914	1909	1904	1899
Copper:					
Number of establishments	33	37	38	40	47
Value of products	$632,897,000	$444,022,000	$378,806,000	$240,780,000	$165,132,000
In New Jersey	244,269,000	159,199,000	.....	.....	.....
Quantity produced:*					
At smelters	655,486	575,069	546,476	406,269	284,333
At refineries	931,790	782,854	702,702	.....	.....
Lead:					
Number of establishments	25	22	28	32	39
Value of products	$192,655,000	$171,579,000	$167,406,000	$185,827,000	$175,466,000
Quantity smelted*	485,612	563,810	352,839	308,603	208,466
Zinc:					
Number of establishments	38	29	29	31	31
Value of products	$103,103,000	$53,538,000	$34,206,000	$24,791,000	$18,188,000
Quantity smelted*	465,743	353,049	255,760	186,702	129,051

*Tons of 2000 lb.

Exhibitors at Indianapolis Exhibition of Steel Treaters

The national headquarters of the American Society for Steel Treating announces the list of those who have contracted for space at the Indianapolis convention and exhibition, September 19 to 24. Although the date is three months off 50 firms, listed below, have arranged for space. There are still a large number of uncompleted contracts and indications are that the Indianapolis show will be larger than the one held in Philadelphia last fall. The interest being aroused among the members of the society and the exhibitors assures a large attendance. This year more manufacturers will have their exhibits in operation than at any previous convention, and an excellent opportunity will be afforded to observe such products under actual operating conditions. The list of exhibitors to date follows:

Selas Co., economic gas appliances in operation.
Chas. Englehard, recording instruments in operation.
Smith Gas Engineering Co., producer gas machines in operation.
Geo. J. Hagen Co., oil and gas furnaces in operation.
Westinghouse Electric & Mfg. Co., electric appliances in operation.
Brown Instrument Co., recording instruments in operation.
Midvale Steel & Ordnance Co., operating exhibit of steels.
Indianapolis Drop Forging Co., forgings in operation.
Calorizing Corporation of Pittsburgh, calorizing process in operation.
Deeds Commercial Laboratories, carbon compounds in operation.
Leeds & Northrup Co., electric furnace and recording instruments in operation.
Tate-Jones & Co., furnaces.
Armstrong Cork & Insulating Co., insulating materials.
Taylor Instrument Co., pyrometers in operation.
Ludlum Steel Co., steels.
Marschke Mfg. Co., electric grinders and buffers in operation.
Simonds Steel Co., steels and saws in operation.
General Electric Co., electric furnaces in operation.
Wm. Ganschow Co., gears.
Bristol Co., recording instruments in operation.
Eaton Electric Furnace Co., electric furnaces in operation.
Bethlehem Steel Co., steels.
Spencer-Turbine Co., blowers in operation.
Driver-Harris Co., alloy pots and boxes.
Crucible Steel Co. of America, steels.
Electric Steel Co. of Indiana, castings.
Halcomb Steel Co., steels.
Atlas Crucible Steel Co., steels.
Bell & Gossett, case-hardening materials.
Iron Age Publishing Co.
Deeds & Chapin, "Cinch" cement.
General Alloys Co., alloy pots and boxes.
Electrical Refractories Co., refractory materials.
W. S. Rockwell Co., oil and gas furnaces.
Electric Alloy Steel Co., alloy steels.
Colonial Steel Co., steels.
Herman A. Holz, Inc., metallurgical equipment.
Imperial Drop Forge Co., forgings.
Vanadium Alloy Steel Co., steels.
Heppenstall Forge & Knife Co., die blocks.
E. C. Atkins Co., metal saws and cutting machines.
Mahr Mfg. Co., furnaces.

New Bureau Proposed

The National Association of Brass Manufacturers held a convention at Buffalo, June 2 and 3. Reports were received from the committee on standardization and will be published later. Figures submitted indicated that business is about 50 per cent of normal, comparing the first part of this year with the first half of 1920. A resolution was adopted recommending the establishment, within the jurisdiction of the Secretary of Commerce, of a bureau where all merchants and manufacturers could confer and ascertain what they may do legally in regard to associated effort. The next meeting will be at Cleveland, Sept. 14 and 15.

Predicts Revision Downward

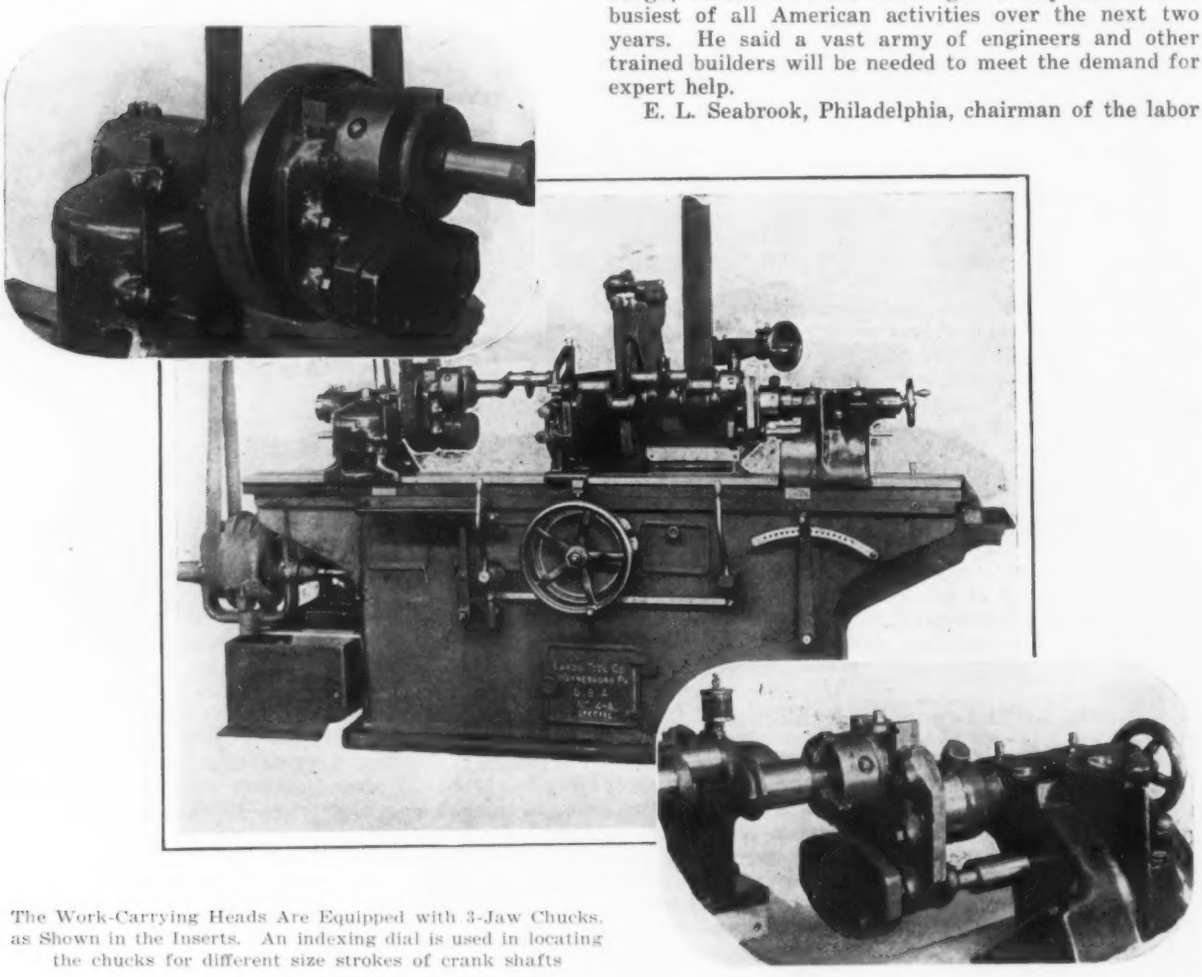
To permit American steel manufacturers to compete with European makers, prices of steel products must be further revised downward, states Severn P. Ker, president of the Sharon Steel Hoop Co., Sharon, Pa., who also predicts one and possibly two more wage reductions before the end of the year. Manufacturers generally in the Shenango Valley state that 1921 will be the leanest year in a long time and do not look for appreciable improvement in business until late fall. None of the 14 blast furnaces in the Valley is in blast, while mill schedules are weak.

The June meeting of the New York Chapter of the American Society for Steel Treating was addressed Wednesday evening, June 15, at the Machinery Club, New York, by Kenneth B. Millet of the Griscom-Russell Co., 90 West Street, New York, on the subject, "The Cooling of Quenching Oil in the Heat Treatment of Steel."

Automotive Regrinding Machine

A recent development in machinery for re-grinding all parts of automotive engines is represented in the 4-A special grinding machine lately marketed by the Landis Tool Co., Waynesboro, Pa. In its development all thought was given to a combination of features which would make it a utility machine in every sense of the word.

The crank-carrying fixtures shown in the accompanying illustration were designed to handle crankshafts easily and to eliminate all loose attachments such as chucks, dogs, blocks and so-called throw blocks. Work carrying heads which are part of the headstock and the footstock are equipped with 3-jaw universal chucks and grip each end of the crankshaft. Bushings are not necessary. An indexing dial above the chuck, as shown in the accompanying insert, is used for locating the chucks for different size strokes of crankshafts and is operated by a small crank. The work-carrying heads are centered and brought in line by use of locating pins, also shown in the insert, after which



The Work-Carrying Heads Are Equipped with 3-Jaw Chucks, as Shown in the Inserts. An indexing dial is used in locating the chucks for different size strokes of crank shafts

operation the machine is ready to receive the work.

The shaft is then placed in the 3-jaw chucks, brought in line and trued radially by means of the truing device located on top of the work rest; after which the chuck jaws are drawing up fairly tight, although not as tight as for lathe work. The truing device is then removed and the work of re-grinding proceeds. The re-grinding operation is accomplished in from 1 to 1½ hr. four-throw shafts and 1½ to 2 hr. for six-throw shafts.

The machine will also grind all other parts of automotive engines with the exception of cylinders cast en-bloc. The wheel carriage has power speed and all traverse speed changes are controlled by one lever. The machine carries a 24 in. diameter wheel with a 5 in. belt for driving it and the wheel can be worn down to hole or safety point. The maker calls particular attention to the heads of work-carrying fixtures and the automatic balancing weights which can be moved in and out from the center according to the size of crankshafts The machine is driven through a small countershaft and requires 5 hp. to operate.

Sheet Metal Contractors at Pittsburgh

The annual meeting of the Associated General Contractors of America and the National Association of Sheet Metal Contractors was held at the William Penn Hotel, Pittsburgh, last week, from Tuesday until Friday, with about 500 delegates in attendance. Gen. R. C. Marshall, who during the war, was contractor in chief of army construction of cantonments, factories, defences and hospitals in America, was one of the speakers and said that building costs will drop to pre-war levels when wages are lower. He predicted that cost accounting systems will eliminate the practices of deceiving the public.

Clifford G. Donnells, department of engineering and construction, Carnegie Institute of Technology, Pittsburgh, stated that the building industry will be the busiest of all American activities over the next two years. He said a vast army of engineers and other trained builders will be needed to meet the demand for expert help.

E. L. Seabrook, Philadelphia, chairman of the labor committee of the National Association of Sheet Metal Contractors, in his report said: "Six principles to be recognized in making agreements with employees were set forth by the labor committee. These are: No sympathetic strikes, no restriction of production, elimination of anything that causes friction or trouble and can in any way regulate wages or influence production, increased number of apprentices, those under control of employers; local trade autonomy and no boycotting of materials."

An aggressive campaign to lower the cost of labor in the sheet metal industry is to be started by the association, and it is the opinion of the members that every indication points to a gradual price decline for several years to come.

Between the sessions, the delegates made trips of inspection to a number of manufacturing plants in the Pittsburgh district.

Secretary Davis Aims to Prevent Strikes

Would Have Key Men to Study Major Industries from Standpoints of Both Labor and Capital and Bring About Settlement of Troubles

WASHINGTON, June 21.—Prevention of strikes, rather than attempts to stop them after they have taken place, is the conception in the mind of Secretary of Labor James J. Davis, who now is engaged in formulating a plan looking to the application of this principle. The proposal under way is to be submitted to Congress and would entail an annual outlay by the Government of approximately $250,000. It is believed by Mr. Davis, himself an organized labor man and one-time puddler, that fully nine-tenths of the strikes occurring in this country could be prevented and he hopes through his proposed plan to keep industry and workers alike engaged and to establish more harmony between capital and labor. Mr. Davis feels that he knows the minds of both interests and is acquainted with the difficulty of solving strikes, once they have begun.

Concisely, his plan is to have the Government provide "key" men, one for each of the 15 major or "key" industries, including iron and steel. One of these men, with two assistants, would be assigned to each major industry and their duties would consist of making a study of the industry, both from the employers' standpoint and also from the viewpoint of labor. As Mr. Davis terms it, "they would be governmental liaison officers between the employer and the employee, and would be in close touch with operations in the industry and the work of the labor unions. They would always have at their finger tips every bit of information as to what was going on all the time. When something came up between employer and employee, they would have immediately at hand all the information necessary to effect a quiet settlement before it could even reach the strike stage."

All Labor Included

While Mr. Davis appeared to lay stress on the question of keeping in touch with operations in the industry and the work of the "labor unions," it necessarily is indicated that he was not speaking in a restrictive sense, but, of course, means to include all labor, open-shop as well as organized.

Nevertheless, Mr. Davis is a strong supporter of organized labor, which appears to be natural enough, in view of his past affiliations, and is considered to have assumed a partisan viewpoint when he made the statement that in some of the strikes "there can be seen a hand working to destroy or throttle unionism," which, he stated has not been effective. In a tone which was implied as a warning to employers, he said that those working for the destruction of unionism should look twice. If they succeeded, he maintained, they will undoubtedly find something else much more powerful will spring up. He insisted that unionism cannot be abolished "for where there is a handful of men who will stick together and loyally support the cause of unionism, it cannot be downed."

Going further into his plan to prevent strikes, he stated that the "key" men could quickly ascertain "whether the methods of the union representatives were fair and whether spy systems of the employers or the unions were being carried on properly. In fact, money, both for the unions and the employers would be saved, for with such a governmental representative always on the job these systems, which have grown up, could be abolished, with the knowledge that there was a man always on the job who would foresee troubles and take them up before either side had the opportunity."

Secretary Davis said that the system of spying, which has grown up in various industries is hurtful, and it was assigned as the cause of many strikes. It is his opinion that the "key" men would be able to eliminate much of the suspicion between employer and employee.

Fairness Must Prevail

Conceding that the present is a trying time in the industrial and labor world, Secretary Davis said that only on the ground of fairness can both sides be brought together to settle disputes. He pointed out that the element of patriotism to which his predecessor could appeal to settle disputes during the war can no longer be resorted to in the sense that it was during that period.

Occasion was taken by Secretary Davis to say that one of the greatest needs not only during the period of readjustment, but for all times, is that of collecting and disseminating monthly information on costs of living and wages, which now is gathered semi-annually, providing too great a gap to be of any effective use. He stated also that the question of cost always enters into every dispute. In this connection, however, it may be pointed out that Secretary of Commerce Hoover, through co-operation between the Bureau of Census, Department of Commerce, and the Bureau of Labor Statistics, Department of Labor, is preparing to compile statistics on the cost of living and retail and wholesale prices, at frequent intervals. It was the contention of Mr. Davis that the information could be gathered by the "key" men and that this work would be part of their duty in keeping in close touch with everything affecting their particular industries. It was asserted that they would always have on hand up to date figures on which they could rely in straightening out difficulties in which the cost of living problem is used as an effective wedge. Secretary Davis said that it is one of the big questions facing labor and capital in the wage adjustment at this time. He stated that labor is taking wage reductions, generally speaking, without much complaint. Reports to the department indicate that both sides are inclined to be fair and to see the troubles that are facing each other during this period of readjustment.

In stating that the cost of living question is one of the principal factors to be taken into account in making wage readjustments, Secretary Davis said that the building industry furnishes one of the best examples of this fact. In that trade, he said, there are serious difficulties to be overcome. Labor must have enough money in wages to pay for rent and a decent living. The landlord and builder must get enough from their property to pay for the investment. It now costs approximately $6,000 to build a modest house which a laboring man can occupy. This home could be built before for from $3,000 to $3,500. The builder or landlord must collect enough rent to get at least 11 per cent on his investment, was Mr. Davis' contention.

Molders of the H. B. Smith Co., Westfield, Mass., heating radiators, etc., on strike since the latter part of March for a $6.25 per day wage, have accepted the company's offer of $6, effective June 20, to continue for three months. At the end of that period the wage scale will again be acted upon by parties involved. Under the old agreement, which expired April 15, the men received $7.20 a day.

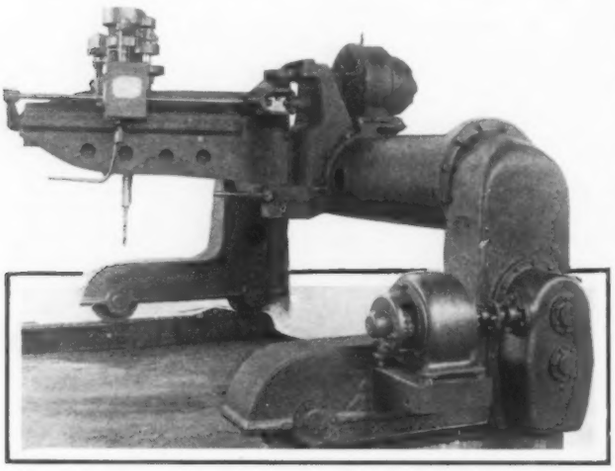
For the purpose of stimulating building operations in Hartford, Conn., the Structural Building Trades Alliance of that city has made a voluntary offer of a flat 10 per cent reduction in wages.

Gantry Drilling Machine

The gantry drill shown in the accompanying illustration is a special machine designed and built for a tank car manufacturer by William K. Stamets, Pittsburgh.

Mounted on a track, the gage and length of which can be varied to suit the particular requirements of each user, the machine is traversed by means of a motor equipped with a suitable controller. There is a drilling head mounted on the radial arm, the latter swinging on its support on the cross beam. The illustration shows but one drilling head, although two, three or four arms and heads can be just as readily employed. Two arms can be used on each side of the beam or if the span be increased, more than four radial arms can be used. Additional drilling heads may also be mounted on each radial arm if so desired.

The motive power of the drill is supplied by the motor mounted on the beam. With direct current this can be an adjustable speed motor or with alternating current it can be a multi-speed motor permitting a wide range of speeds through the combination of the electrically controlled changes with the mechanical changes in the drill head. Other operations than drilling can be performed by a gantry type machine.



The Gage and Length of Track and the Number of Arms and Head May Be Varied to Suit Requirements

The scattering demand for such a tool as well as the widely varying requirements it is called upon to fulfil necessitate it being built as a special rather than a standard machine.

Wages in United States and Abroad

WASHINGTON, June 21.—Wide variance in wages paid in the United States and foreign countries is strikingly set forth in a compilation on the subject prepared for the House Committee on Ways and Means, to be used in connection with the framing of permanent tariff legislation. The material undoubtedly is designed to support a policy of a protective tariff, and is interesting not only as a legislative medium for that purpose, but also to iron and steel and other manufacturers as showing them the advantage of foreign producers in invading markets, American as well as others where domestic makers compete, by reason of lower costs through cheaper labor.

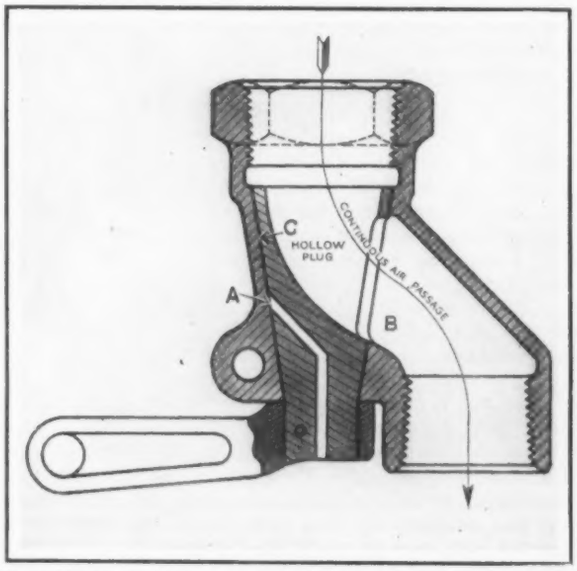
Statements have been made at various times by Secretary of Commerce Hoover regarding the tendency in European manufacturers to consolidate for militant export purposes and the lower wages they pay is looked upon as being one of the principal advantages they have in their favor. This can be observed clearly from the tables carried in the pamphlet prepared for the committee on Ways and Means, the statistics being taken from official sources of the United States and foreign governments, and trade publications, THE IRON AGE being quoted to show that the average weekly earnings of furnace and mill workers in 1920 was $43.12. Similar work in other countries was paid as follows: Germany, $5.34; Japan, $9.90, England, $17.40; France, $16.80 and Belgium $15.63. Conversion of foreign currency was made at the rate prevailing at the time the wage was paid.

The example of iron and steel wages just cited is typical for work in all lines coming under the metal schedule of the tariff which includes the entire iron and steel, together with related industries, and invariably shows especially the unusually low wages paid in Germany, which, with considerable success, appears to be making considerable headway in regaining lost markets. Some of the wage comparisons go back to 1914, more particularly with regard to the United States, and show the increases which apply to all countries except Germany, where decreases are shown, due to the great depreciation in the mark. The greatest increases in wages were in the United States and will average approximately 250 per cent when comparison is made between 1914 and 1920. In a few instances wages paid as far back as 1907 are shown as in the case of puddlers in England, who in that year were paid $2.33 per ton of puddled iron, as compared with $7.50 to $8.27 paid in 1920. Puddlers in 1895 were paid $5.50 per ton in the United States as compared with $16 in 1920. Typical of pay in foundries, it is shown that in the United States in 1920, core makers were paid a weekly wage of $31.36, as compared with $8 paid women coremakers 20 years old, in England, while for machine workers the weekly wage in the United States was $27.59 as against $7.42 for women in England. Lathe operators in Germany were paid 50 cents for an eight-hour day in November, 1919.

Pressure Seated Air Valve

A new valve for general use in high pressure pneumatic service, designed to eliminate air losses through leakage in transmission, has been developed by the Cleveland Pneumatic Tool Co., Cleveland. It is being marketed under the name of Cleco.

In this design the air does not come in contact with the seat and the air pressure is utilized to hold the valve plug on its seat, thus eliminating packing, gaskets, stems and springs, and preventing the destructive action of compressed air on them. The valve parts are reduced to three: body, plug and handle. This was accomplished by using a hollow taper plug with the large end uppermost. The air enters at the top, passes through an air opening in the side of the hollow plug and into the supply chamber which connects directly with the air hose without the air coming in contact with the valve seat (ground joint) which is the outer wall of the plug.



When Shut, the Airport A Registers with Supply Chamber B, Allowing Air Trapped in Hose to Escape to Atmosphere

A waste arrangement is provided to allow accumulated pressure in the air hose to escape to the atmosphere when the valve is shut off. This is to safeguard the operator when disconnecting the hose from the valve.

Purchasing Agency for Short Line Railroads

Five Hundred Companies Will Buy Iron, Steel and Other Products in Quantities—Hope Entertained That Important Economies Will Be Effected

BY L. W. MOFFETT

WASHINGTON, June 21,
THE IRON AGE BUREAU,
816 Fifteenth Street.

ESTABLISHMENT in Washington of a consolidated purchasing agency by the American Short Line Railroad Association, announced last week, has followed a careful study of the plan in which producing interests, including the iron and steel trade, are concerned. It is looked upon as a logical step by which the short lines in the association, representing 500 separate corporations, with a combined main line mileage of approximately 25 000 and about $2,000,000,000 in capital will make purchases in quantities instead of individual lots for single lines as has been the practice. The benefit is expected to accrue alike to the association membership and to the manufacturers supplying equipment and supplies of all kinds to the short lines. The consuming power of these carriers with regard to iron and steel products is large and the operation of the new system of purchases will be watched with considerable interest by the trade. In short, it is the hope of the short lines, by this new method, to obtain material it uses as cheaply as it is bought by the trunk lines.

To Lower Costs

The move necessarily is economic in its character and is looked to as one means of lowering railroad operating costs, with which the Interstate Commerce Commission is actively concerning itself, as pointed out by J. W. Cain, who is the manager of purchases of the association, with offices at 423-424 Bond Building, Washington, but which, on July 1 will be removed to the Interstate Building, 1319 F Street, N. W. While combined purchases of requirements, it is believed, will result in valuable economies to the short lines, it is predicted that in like manner the cost to the manufacturer will be greatly reduced by dealing in quantities through one purchasing agency only, and serve at the same time some 500 railroads. It is pointed out, for instance, that a steel mill which is given a large order to roll necessarily can produce more cheaply than it could in the case of a light order with the necessity of changing rolls more frequently. The statement made in some quarters that the new plan of buying would eliminate competition is not accepted by the association as being sound. Contention is made that, under normal conditions, there is a rather well balanced equation between supply and demand, arising naturally from the law of business, and that capacity will be engaged as heretofore, but under a different arrangement by reason of the greater quantities of given requirements for steel mills or other producing and supplying units, provided prices and terms are agreeable. There may be certain varying effects on some interests under the new arrangement, however, whose extent cannot be fully indicated until it has been in operation for some time. An indication of changes in manner of purchases, though, may be gathered in the plan with regard to purchasing second-hand material. Much of this, as, for instance, relaying rails, now is bought from second-hand and scrap dealers, but in the future inquiries will be sent direct to trunk lines. Ordinarily, the latter, in tearing up track, are unable to dispose of the tonnage, because of its large quantity, to any single short line, and in consequence include it in their scrap lists and dispose of it to scrap dealers.

Selling the Surplus

The consolidated purchasing agency really will be more than its name implies because it not only will buy material, but compile a listing of materials which the short lines do not need with the object of selling the surplus and also will arrange to provide an exchange of equipment among the roads. Moreover, it will have car and locomotive builders help in designing cars and locomotives, with the idea of a certain degree of standardization in mind, and will promote sales of cross ties and other natural products.

The agency, as pointed out to THE IRON AGE by Mr. Cain, will have three sections or departments, as follows: New equipment and materials, second-hand equipment, and industrial development. They will be dealt with in the order named.

The so-called short line railroads vary in size and character from a small industrial railroad with practically a one man organization up to a completely equipped railroad of several hundred miles. They are located in all parts of the United States, some in remote sections, and for this reason the selling expense to the manufacturer in proportion to the volume of business done is such that his margin of profit to these lines must be greater than to the trunk lines, it is explained in discussing functions of the new equipment and materials section.

Will Use Budget System

The consolidated purchasing agency will secure from these lines budgets of their anticipated requirements for the approaching quarter, and from these budgets the various items will be tabulated and consolidated. Inquiries will then be sent to the manufacturers on a basis of the aggregate quantities to be purchased, and they will be given shipping specifications at the same time to enable them to make up manufacturing schedules, thus, it is stated, bringing about a reduction in cost.

Where advisable, a blanket agreement will be made with a manufacturer covering a group of lines in a certain territory; or where practicable from a distribution standpoint, for the entire membership of the association, whereby all requirements in his particular line will be bought exclusively from this manufacturer.

Orders will either be sent direct by the member lines, or through the consolidated purchasing agency, as may be deemed most expeditious, but in all cases the material will be shipped and invoiced direct to the railroad company.

In the purchase of fuel, wherever practicable, an agreement will be made with mines or oil producers, whereby their total output will be taken and distributed to a group of lines in that particular territory.

Designing Rolling Stock

The locomotive and car builders will be asked to assist in the design of composite cars and locomotives, using, wherever possible, standards for which patterns are already available, and any other manufacturing practices which will make for economy in the construction of equipment and yet secure for the short lines the very best product obtainable.

By following the foregoing plan it is believed that the short lines will soon be accorded prices in line with those now enjoyed by the larger trunk line systems, Mr. Cain stated.

Discussing the purposes of the second-hand equipment section, he stated that there are a great many short line railroads that are endeavoring to use equipment entirely unsuited to their needs. In some cases this equipment was bought during the construction

period and from divers sources. The short line has been unable to dispose of this equipment except at a sacrifice usually demanded in second-handed deals, and has, therefore, worried along with it at a considerably greater expense than if an exchange could be made for something different. The consolidated purchasing agency is, therefore, planning to send out questionnaires to each line, asking that it list such equipment or material as it desires to sell, with a fair price thereon; and in another column it will be asked to list such equipment or material as it desires to purchase provided proper disposition can be made of that which it has for sale. These items will then be tabulated and negotiations started between the various roads. For example, one line may have a locomotive too small for its needs, while another member has one too large for its needs, and by an exchange each road would have equipment adaptable to its service without any appreciable additional outlay.

Inquiries to Trunk Lines

Wherever a short line railroad is in the market for second-hand equipment, and nothing of the desired quality and specifications is available among the members of the association, inquiries will be sent direct to the trunk lines and the sale of the equipment handled direct from the trunk line to the short line at what is believed will be a considerably lower cost than in the past where it has passed through a number of hands.

Taking up the work of the industrial development section, it is pointed out that the short lines, located as they are in all parts of the country, originate a large quantity of raw materials used in various industries, and this department will devote its efforts to developing these various sources, primarily for increasing the traffic of the various lines, but of equal advantage to industries in general and to the entire railroad system of the country.

In the matter of cross ties alone, the short lines probably originate the greatest percentage, and through the operation of this department, sales will be promoted between the producers along the short lines and those trunk lines not located in tie producing territories.

While it will require a great deal of time and energy to work out the various details of the new plan of the association, considerable headway, it was declared, has been made through the splendid co-operation and help of the manufacturers.

DRIVE FOR TAXES OVERDUE

Bureau of Internal Revenue to Begin July 1 on Collecting Amounts Withheld

WASHINGTON, June 21.—Announcement made public yesterday by the Bureau of Internal Revenue that "millions of dollars in delinquent taxes and penalties, it is estimated, will be collected by the Bureau of Internal Revenue as the result of a general tax drive beginning in July, which will reach every section of the country," came as no surprise. It has been anticipated for some time. It is stated that the work will be directed to the collection of excise tax on sales by manufacturers, the tax on transportation, the so-called luxury tax, the jewelry tax, the tax on toilet articles and proprietary medicine, the soft drink tax and the admission tax.

Preliminary moves looking toward the preliminary "drive" have been under way for some time, and the action has created considerable interest. It is understood that the Bureau has, among other things, made a check-up of income and excess profits tax returns by all corporations covering the past three years, and that letters have been sent out requesting payments aggregating from $2,000,000 to $3,000,000 claimed to be due against errors made in the original returns. It has been pointed out that this move may cause embarrassment on the part of industries, for instance, which, through dividend payments and plant extensions, together with depression in trade and liquidation of stocks, now have little or no ready cash. While, it is stated, borrowing may be resorted to by some corporations, this would be an expensive alternative in view of the high cost of money and also gives an undesirable impression as to the financial standing of interests which are compelled to adopt this plan.

Obviously, it is the need of cash that is forcing a great many manufacturers to take business at current prices, which are said to be below the present high producing costs. With the Government making demands upon companies of this kind, it is stated that payment on back taxes would make for continued liquidation of material, regardless of prices it would bring and would have an unfortunate reaction on business, now in the course of a struggle of readjustment. No contention is made, of course, that the Government should not recover taxes due which up to the present had been escaped through wilful attempt, but it is stated that it has been found instances of this kind do not relate unless infrequently to important producing interests.

The move announced by the Bureau of Internal Revenue comes upon the heels of a similar one just started by the Department of Justice concerning contracts for war material, representing that which was purchased during the war and also bought as surplus after the armistice was signed. Attorney General Daugherty has stated that he will prosecute vigorously those who made excessive profits through such contracts and action already has been taken against one concern, whose contract, made during the previous administration, has been canceled. This particular interest is fighting the case and asserts that the Government is acting in violation of the constitution. The campaign undertaken by the Attorney General is said to have been first approved by the President. It is reported that it is based largely on the voluminous report of the House committee headed by Representative Graham of Illinois which investigated war expenditures. It is staying within the limits of conservative statement, however, to state that this report has been repudiated to a great extent and is shown to have carried unfair and inaccurate statements. It was adopted by the House with apparently considerable misgiving.

Employment Holding Up in Detroit

DETROIT, June 18.—The report of the Employers Association of Detroit for the week ended June 7 shows that there were employed in the 79 plants of members of the association a total of 113,530 persons, as compared with 113,406 for the week of May 31. Thus there were 124 more men on the payrolls. Even more satisfactory is the statement that of the above total there were only 20,312 men working part time, as compared with 23,135 the previous week. These men were distributed among 27 plants, and their average working time was 31 hr. a week, or one-half hour less than during the week of May 31. There were 93,218 full time workers, or 2947 more than the previous week.

Considering that the high mark of employment this spring was the week of May 10, when 118,497 workers were on the payrolls, the decrease since then has been only 4967.

Compensation Law Set Aside in Missouri

The operation of the workmen's compensation law passed by the Missouri Legislature early this year and which was to become effective June 21, has been suspended pending a vote of the people in November, 1922. This was done by the filing at Jefferson City, June 18, of petitions, signed by 85,000 voters, for a referendum on the law, and the filing of petitions submitting under the initiative a proposed new law. The proposed law seeks to abolish the contributory negligence defense and to provide that question of assumption of risk is a question of fact to be determined by the jury.

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The Time Factor in Cheap Steel

The steel trade is receiving plentiful advice from persons who neither buy nor sell steel and who, judging from their comments, are not familiar with the reasons for the present lack of demand for steel. Chart makers and plotters of price diagrams find that the steel market has not made as close an approach to pre-war prices as have wheat, corn, cotton, wool, rubber, leather and copper. Straightway they point out to the producers of steel that as steel is the barometric industry it ought not to be out of line with industries not so barometric, and therefore they should take immediate steps to give steel prices something like the fall that has been seen in the commodities named.

We do not take issue with the opinion that prices of steel will go lower. But those who have contact with buyers of steel do not find them saying that they are refraining from buying because the prices asked are too high. They simply are not buying steel because they do not have any present use for it. For example, very considerable stocks of agricultural implements are stored in warehouses or on the floors of implement manufacturers. Until they can move a good part of these stocks the implement makers are not interested in buying steel.

The railroads will be needing large amounts of steel one of these days. They do not need much steel now. They have in storage a good many rails which the mills rolled in the earlier months of this year, and which it was expected would be put in track by this time. It is true they think the price of rails ought to be reduced and will be reduced, but were it reduced to-morrow rail orders would not come in. The railroads are not buying rails; they do not want rails.

The pig iron market and the steel market are moving downward with the same forces playing upon them that have caused the recessions in wheat, cotton, copper and the other commodities cited above. The wheat and cotton growers and the copper producers did not make the prices of their products; their markets were made for them, and against their desires The same is true of pig iron and steel prices. If there were any power in the steel industry that could decree to-day a price of 1.50c. for steel bars, plates and structural shapes, how much would be gained by issuing the decree? Why not be satisfied to have the price of bars determined by all the downward-working factors in the situation? If, as is commonly said, some leading commodities have suffered too violent a decline, is the experience of producers of these commodities such as to make it desirable that the same thing should happen in steel? There is liquidation of stocks of steel throughout the country. Would the banks which have made loans to the owners of such stocks prefer to have the values they represent horizontally dropped $10 per ton or liquidated under such a gradual decline as is actually taking place?

Some of the mentors of the steel trade have overlooked the factor of time in the readjustment now going on. The state of mind of many workers, particularly in the building trades, needs to be changed before there will be large-scale activity once more; likewise the state of mind of many manufacturers and merchants who have forgotten the old-fashioned economies and need to learn them over again. Moreover, there is no such cheap money or cheap credit in sight as are indispensable to a building movement involving any considerable use of steel. Time will be required for the accumulation, through working and saving, of such a new reservoir of credit.

Whenever, after a period of liquidation, there has come an abundance of cheap money, cheap steel has never been wanting to complete the combination that has led the way to new activity in industry. But the censors of the steel market insist on the magic of an immediate production of effects which history shows have always required the lapse of time.

The growing importance of chromium to the steel industry of the United States is emphasized by the fact that imports of chrome iron ore are now larger than ever, not excepting the war period. For the 10 months ended with April, receipts were 13,313 gross tons per month, against 12,523 tons per month last year, 9662 tons per month in 1916, the war record, and only 5431 tons per month in 1913. Previous to the war very little alloy steel containing chromium was used,

being largely chrome-vanadium steel for the automobile industry and other users of alloy forgings. To-day chromium is the essential constituent of all stainless steels, of anti-friction ball bearings and of many special alloy steels. It is probably the most important alloying element, not excepting nickel. With the disappearance of war prices has come the supplanting of American ores by foreign. In 1918 the United States produced 82,430 tons, or more than any other country on record, but domestic output has dwindled to a small figure of late.

Conferring with Secretary Hoover

The recent meetings of editors of business papers with Secretary Hoover have marked an important departure in the relation of business and Government. The secretary, instead of antagonizing representatives of the business interests, has made them feel that they are welcome and has freely sought their advice on the many important problems which confront him. He is a man of vision, with unusual ability to see what the real troubles of the business world are, although he does not pretend always to know what the remedies are; in fact, his modesty is one of his most impressive characteristics.

As to the reorganization of his department, Secretary Hoover realizes that it is not an easy undertaking and he does not expect the trade press to make a thorough investigation of the subject as has been done by other agencies, but he does believe that representatives of business can be helpful in bringing about a more business-like organization of the department.

As to the relations of the Federal Trade Commission to business, Secretary Hoover has not hesitated to express the hope that the commission would devote itself to a larger extent to advising business men and associations as to what they can do, but he gladly gives the commission credit for much constructive work which it has done.

In the presentation of industrial index numbers, as outlined elsewhere in this issue of THE IRON AGE, Secretary Hoover is giving information in a way which will impress many people to a greater extent than would the actual statistics as to production, prices and other features of the industries. He does not claim that the tables as they have been prepared are the last word, but invites criticism. While some of the tables could be improved by being condensed, there is room for amplification in other directions.

Secretary Hoover has impressed the editors not only with his great store of knowledge and his resourcefulness, but also by his courage and hopefulness. He is a man who does not for one moment underestimate the problems which confront the world to-day, but he believes that solutions will be found and has unshaken faith that this country will do its full part in improving conditions at home and abroad.

The electric steel industry is operating at a lower rate than any other department of steel making. The statistics of the American Iron and Steel Institute for May show that the output of steel classified as "all other," which is largely electric, had declined 28 per cent from April while the total steel output for May showed no decline. The falling off is further emphasized by a comparison with one year ago. The production of "all other" steel in May, 1920, was 15,688 gross tons; but last month it was only 1543 tons, or a decline of about 90 per cent. The decline in the total steel output was only 56 per cent. In 1920 the electric steel ingot output was 28,913 tons per month, whereas in the first five months of this year only 2500 tons per month was made, of steel called "all other." The one encouraging feature of the industry is the report that some electric steel casting plants have good order books.

Pig Iron Prices

The appearance of Lake Superior iron ore prices for the 1921 season determines the amount of loss furnace companies that consume the ore must absorb, rather than the price they will pay for ore, since as a rule the furnaces have enough ore to last them quite a while after they resume operations. The ore prices represent a reduction of $1 a ton from the 1920 schedule, or a return to 1919 prices. Mesabi non-Bessemer is $5.55 per gross ton at Lake Erie dock. The ten-year pre-war average, 1904 to 1913 inclusive, was $3.36, so that there is an advance of $2.19, or 65 per cent. The present price, since it is based at Lake Erie docks, has to cover increased rail and lake freights, besides increased wages and other operating costs.

The consumers of Lake Superior ore average a consumption of about 1.8 tons of ore per ton of pig iron made, together with one-tenth ton or a trifle more of scrap, cinder, scale, etc. The increment of ore cost, therefore, over the pre-war average, is about $4 per ton of pig iron, plus the increase in rail freight from Lake Erie dock. This single item sets a large barrier against pig iron prices returning to their pre-war level, and if one is thinking of a return to the pre-war low price instead of the pre-war average, the $4 becomes almost $5, for the 1914 price of Mesabi non-Bessemer ore was $2.85.

On a third quarter contract Connellsville furnace coke has sold at $3, and there is no prospect that this figure will be shaded materially in the near future. The freight to the Mahoning and Shenango valleys is now $2.52, making $5.52 per net ton for coke delivered, or at 2200 pounds coke consumption, a low estimate, $6.07 per ton of pig iron. The ten-year pre-war average for Connellsville furnace coke was about $2.20, which with $1.30 freight would make $3.85 per ton of pig iron. The increase in coke cost is about $2.22. Ore and coke together, therefore, add more than $6. In addition there are higher labor cost at the furnace and higher costs of limestone and various supplies. According to present market prices for scrap the increased freight is stood by the seller, but this cannot be expected to continue indefinitely.

A conservatively low estimate is that the cost of making a ton of pig iron at valley furnaces is increased by $8, not over the pre-war low point,

but over the ten-year pre-war average. Over the pre-war low cost the increase would be nearer $10.

It is evident, then, that most descriptions of pig iron in the North already have taken their losses, and are offered, not at what it cost to make them, but at not more than it would cost to make the iron now, and in some cases at less than that. The fact that it has been the custom of the merchant furnaces, with the sharp declines that have occurred in some previous years in coke and ore, to accept such losses without murmur and as a matter of course does not make the losses any the less from a pecuniary point of view.

It does not follow that pig iron prices are now marked for an advance. Possibly the merchant furnaces are not done taking losses, although they have written off $1 a ton both on the ore represented in the pig iron they have in stock and on the ore not yet converted into pig iron, together with the other high costs in the pig iron in yard. Pig iron being a highly competitive commodity, furnaces may be forced to absorb further losses, against the cost of replacement when the time for replacement comes. The question is whether the present furnace stocks will be exhausted before there are reductions in freight rates and further reductions in wages. With normal consumption the stocks would easily win the race, but just now the furnace stocks are moving very slowly.

New Iron from Old

A special application of the non-ferrous electric resistance furnace to the ferrous industry, which may prove to be important, is described elsewhere in this issue. It is the remelting of cast iron scrap or borings under the simplest conditions, not with the object of refining the material, but merely to reconvert it into its original condition as pig iron or iron castings without changing the composition. That this has been easily accomplished seems demonstrated by the tests. It has even been possible to hold such remelted material many hours, unchanged as to composition and ready to use at any time in the liquid state. Its transformation into a different grade would probably be possible.

One reason for the results referred to is the low temperature of the resistance type of furnace, as well as the ease with which cast iron melts. It is probable that the same thing can be done with some other non-ferrous furnaces such as the induction type. Whether the regular steel arc furnace could be so used economically would need demonstration, though the refining and superheating of cupola metal is now regular practice in such a furnace.

Interest in these results lies not so much in the general application of this practice as in its use under special conditions. At present cast iron scrap is usually remelted in the cupola or sold as scrap, but cast iron borings for remelting must either be briquetted or charged in a container. The electrical melting described would be quicker and more advantageous, if sufficiently economical, and could be carried on either in conjunction with the cupola or under other special conditions. Borings are a drawback in any plant and this new method for their speedy reconversion into usable metal is an evident step in advance.

Steel Production Statistics

Production of steel ingots in the United States in 1920 is now reported officially at 40,881,392 gross tons. The actual capacity, as indicated by a discussion in this department of THE IRON AGE of Jan. 20, 1921, may be taken at 52,500,000 tons, so that the production was about 78 per cent of capacity. The partial reports of monthly production indicated that the rate in March was about 45,000,000 tons, when there were various restrictions to full employment, while the reports also indicated that during the first nine months of the year the average rate of output was about 42,000,000 tons, the extra curtailment being due to transportation difficulties. In November and December there was a sharp falling off in production by the independents.

The year 1920 stands fourth in the list of years of high tonnage, having been surpassed by 1916, 1917 and 1918. The record output was the 43,619,200 tons produced in 1917. While 1920 fell about 22 per cent short of showing a capacity operation, the output was 31 per cent greater than the output of about 30,280,000 tons shown for each of the two best pre-war years, 1912 and 1913, those outputs having been between 85 and 90 per cent of the average capacities existing in the two years.

In 1920 the production of steel was restricted by conditions relating to production, including difficulties in transporting raw material and finished product, labor shortage and labor inefficiency. In 1921 production is restricted by difficulties related to the consumption of steel. The cost of consuming steel, or fabricating it into useful forms, has been too high, there are considerable stocks on hand of various manufacturers into which steel enters, and there are other influences affecting consumption. The steel industry would experience no difficulty in functioning if called upon to do so.

The production of finished rolled steel, in the form of plates, sheets, shapes, rods, skelp, bars, etc., was 30,976,297 gross tons, or 75.8 per cent of the weight of ingots reported. This is strictly according to form as the rolled steel in recent years has run at about 76 per cent of the ingot tonnage, except when the proportion was depressed by the production of shell steel ingots which were heavily cropped. The production of rolled iron in 1920 was 1,377,566 tons, the output being smaller than in 1916, 1917 and 1918, just as was the case with the output of ingots and of rolled steel. Production of steel castings was 1,251,542 tons, bearing much the same relation to outputs in previous years as that shown by ingots.

While the total output of rolled steel in 1920 fell a shade below the output in 1916 and 2.2 per cent below the output in 1917, several important finished steel products broke all previous records. Skelp stood out prominently, breaking its previous record, made in 1916, by 10 per cent. Structural shapes broke their record by 6 per cent, while black sheets broke their record by 22 per cent. These gains were offset by losses in other commodities, rails in particular.

In 1920 the United States Steel Corporation produced 19,277,960 tons of steel ingots, or 47.2 per cent of the total ingot production, against 51.0 per cent in 1919 and 45.5 per cent in 1918. In 1918 the corporation's proportion of capacity and proportion of production were approximately the same. On account of new construction by independents the corporation's proportion of capacity is now about 43 per cent. Its output ran ahead of its proportion of capacity in 1919 and 1920, as it bids fair to do this year.

Government Offers Surplus Steel for Sale

WASHINGTON, June 21.—The policy of the Shipping Board announced in THE IRON AGE of March 31, to dispose of approximately 300,000 tons of surplus steel, practically all of which is still on hand, to a foreign country has not been carried out. It is understood that this plan has been abandoned and that an effort will now be made to sell the entire surplus to domestic buyers. This is indicated by the fact that the Shipping Board is again advertising for bids, to be opened here on July 26, for 110,000 tons of plates and shapes at Hog Island. Bids were received on this lot of steel early in March, but were rejected as being too low. It is believed that as on the previous occasion only scrap prices will be offered for the material, practically all of which is fabricated, and about 30,000 tons assembled. Approximately 60,000 tons consists of punched plates, not assembled.

It will be some time before the new board sets up machinery for liquidating, but it plans to dispose of the surplus property as quickly as possible. The remainder of about 200,000 tons of steel, according to present inventory, is to be offered soon, it is said, despite the condition of the iron and steel market.

F. J. Ryan & Co. Acquire Electric Furnace Department

An item in the June 16 issue of THE IRON AGE stating that the Lancaster Iron Works, Inc., Lancaster, Pa., had acquired the electric furnace business of F. J. Ryan & Co., Philadelphia, was incorrect. A correct statement is that F. J. Ryan & Co. have acquired the electric furnace department of the Lancaster Iron Works. F. J. Ryan & Co. have also taken over the selling rights in North, South and Central America for the electric furnace developed by the Bario Metals Corporation. This firm has just received a contract for all of the furnace and burner equipment to be installed in the new works of the Philadelphia Spring Co., Philadelphia. The furnace and burners will be of the Mircs design.

Wealth of the United States

Figures from the United States Chamber of Commerce place the national wealth of the United States in 1920 at $290,464,000,000, or $2,747 per capita. The amount is divided as follows:

	Millions	Per Cent
Real property	$169,070	58.2
Farm implements and machinery	2,030	0.7
Live stock	9,570	3.3
Gold and silver coins and bullion	3,550	1.2
Manufacturing, machines, tools, etc.	9,280	3.2
Railroads and equipment	20,000	6.9
Street railways	6,960	2.4
Telegraph and telephone systems	1,972	0.7
Shipping and canals	2,059	0.7
Irrigation enterprise	406	0.1
Public utilities, privately owned	3,567	1.2
All other property (a)	62,000	21.4

(a) Inventory of agricultural, manufacturing and mining products, imported merchandise, clothing and personal effects, furniture, automobiles and carriages, Pullman and private cars, etc.

CORRESPONDENCE

German Competition in Cranes

To the Editor:

I note in the June 16 issue of THE IRON AGE, page 1649, an article in reference to foreign crane tenders. I thought it might be of interest to you to know that on a recent quotation made by us on a locomotive crane for a Government contract in Buenos Aires, Argentine Republic, our quotation, which was figured on a very close basis was approximately $9,000. The order was placed with a German maker for 15,150 Argentine paper pesos, which, with exchange at 31, amounts to $4,700 United States gold.

You can appreciate the fact that with German machinists being paid only 25c. per hr., they can well afford to take an order for cranes of this kind at half our price and still make more money than the American manufacturers. A number of the continental countries in Europe are exacting a tax of 50 per cent on all German merchandise, besides certain other restrictions in favor of the local manufacturers.

J. R. BATES,
Wonham, Bates & Goode Trading Corporation.
New York, June 18.

The Crompton & Knowles Loom Works, Worcester, Mass., has announced a general wage reduction as of June 20 amounting to 12½ to 15 per cent, and prices for at least some of the looms manufactured by the company are to be revised downward. The plant continues to employ 2000, nearly its normal force, and has been operating on a six-day, 50-hour week throughout the business depression.

The Iron Age and Its Readers

If anything were needed to insure respect for reputable business and technical journals, the so-called standard of practice adopted June 7 by the Editorial Conference of the New York Business Publishers' Association would supply that need. The business periodicals for some time have had a code, but the organization of editors has felt the want of a creed of its own, based on the relations of editor and subscriber. Only journals subscribing to the code may remain in the association; but the main object is to point the way and to maintain standards which will increase the prestige and accomplishment of the business press as a whole. The code is as follows:

The editor of a business paper should dedicate his best efforts to the advancement of the industry which his paper represents, in all ways consistent with the public welfare, as well as to measures of public service, and to this end should pledge himself:

1. To consider first the interests of the subscriber.
2. To work for truth and honesty in all departments of his publication.
3. To publish in an impartial way, free from personal opinion, the news of industry in which the paper circulates.
4. To disregard advertising considerations in the editorial conduct of his paper.
5. To be a leader of thought in his editorial columns and to make his criticisms constructive, with the object of bringing his industry to higher levels of thought and practice and to a greater measure of public service.
6. To support in his columns such worthy measures of public interest as their importance justifies and the space available permits.
7. To give proper credit for articles taken from other publications and to avoid unfair practices in competition with them.

What Tariff Rates on Our Minerals?

Relation of Proposed Duties to the Conservation of National Resources—Manganese, Chrome, Graphite, Magnesite and the Ores of Steel Alloys

BY F. LYNWOOD GARRISON*

THE demand for high import tariff protection to encourage the development and production within the United States of certain minerals lately known as "war minerals," is a subject upon which there is likely to be much difference of opinion and is one demanding a critical and comprehensive study by the political economist. Not until the stress of war demonstrated our domestic lack of several of these essential natural products did we become fully aware that this great, rich country we imagined to be self contained was not altogether so fortunate.

It was quickly realized shortly after we entered the contest that it would be impossible to carry on our enormous steel industry without very large amounts of manganese ore, most of which would have to be imported. In the year 1915 we produced from our own territory only 9700 gross tons and imported 313,985 tons. During 1916 the figures were: domestic ore, 27,000 tons, and imported ore, 576,321 tons. A memorandum prepared by the writer for the Department of Commerce and dated April 17, 1917, estimated the total probable needs of this mineral in our steel industry for 1917 at 720,000 tons. Actually there was consumed that year 744,158 tons,† of which 114,216 tons was of domestic origin. The following year, under the sitmulus of war, our domestic production reached 305,869 gross tons; in 1919 it dropped to 58,085 tons, followed in 1920 by but 50,000 tons. Imports were 333,344 tons in 1919 and 500,000 tons in 1920.

The steel maker demands an ore containing from 43 to 50 per cent of metallic manganese, a specification becoming more and more difficult to meet.

After a careful study of the situation during the war our Government geologists concluded it would be very difficult to obtain from any domestic source more than a fraction of the required manganese ore approximating this standard, and even that rate could not be maintained for more than two or three years. Of lower grade ores containing from 15 to 25 per cent metallic manganese, we have a great abundance. But unless metallurgical practices are changed, there will be no demand for them until the price of the high grade imported ores becomes for various reasons so great that it would pay either to beneficiate or concentrate these lean ores to a better grade; else use the poorer material without improvement.

Effects of Manganese Ore Duty

Manganese ores, whether rich or poor, occur usually in superficial deposits. When associated with silver manganese is sometimes found at relatively greater depths, but as a rule—and it applies to all countries—it is of shallow habitat and origin.‡ Consequently, it is not likely we will find in the future any important manganese deposits whose existence is not already known or whose presence would not have been suspected except for some deep underground explorations. A high import duty on foreign ores would undoubtedly increase the cost of ferromanganese to the American steel maker to a point where it might be profitable for him to do one of two things, possibly both. First, to improve the grade of our abundant lean ores by concentration with mechanical methods or combined mechanical and chemical treatment; second, by changes in metallurgical practice whereby ferromanganese containing a smaller proportion of manganese can be utilized in open-hearth steel production.

If on the other hand a protective tariff simply results in stimulating the production and consequent depletion of our relatively very limited reserves of high grade manganese ores (*i.e.*, between 45 and 50 per cent Mn.), it would in fact become destructive rather than protective in depleting an essential asset which might be sorely needed in a National emergency.

The Situation in Chrome Ore

The same arguments apply equally well to chrome ores, although the amount of that mineral consumed in our industrial arts is much less than in the case of manganese.

Of chrome minerals we imported in the year 1914 74,686 gross tons and produced from our own territory only 591 tons. In 1918 the imports reached 100,224 tons and the domestic production was 82,350 tons, with a reserve on hand Dec. 31, 1918, of 42,687 tons. From 75 to 80 per cent of the domestic supply came from California and Oregon. In 1919 the native production fell to 3900 tons and in 1920 almost wholly ceased.* The California chrome deposits are mostly back in the mountains, remote from railroad transportation. They are often if not usually small and seem to be rather non-persistent in depth, although chromite, unlike the manganese minerals, may be expected at any depth. With the exception of the Pacific coast deposits and a newly discovered, apparently large series of deposits on the Kenai Peninsula, Alaska, there are no chrome reserves of any importance in the United States. The old mines along the Pennsylvania-Maryland boundary line have been worked out and no new deposits have been discovered in that district.

Under present post-war conditions it is impossible to mine and market our American ores at a profit in the face of competition with abundant and rich imported ores, which by reason of their great weight as compared with bulk, are cheaply shipped as ballast from foreign ports. An import duty heavy enough to keep out foreign ores will mean a very great increase in price to the consumer of all classes of chrome compounds, and unless the duty is very high the Pacific coast chrome ores cannot be operated at a profit because of their necessarily great labor and transportation costs. Now the question arises, are we justified in imposing this heavy increase in the cost of chrome products upon the American public for the sake of stimulating into life a very small, at present moribund, mining industry on the Pacific coast? At best, even during the war, very few people were employed in it, and as chromium is a vital ingredient in the production of military munitions, is it not a sounder, safer economic policy to conserve these limited chrome resources within our own territory for war emergencies? Moreover, chrome ores are relatively scarce and the demand for chrome products is increasing in leaps and bounds, especially for the manufacture of paints and tanning compounds, to say nothing of its use in steels adapted to the automobile industry.

Pyrites

The manufacture of sulphuric acid is an old, well-established industry in the United States. Until our entrance into the war it was produced chiefly from imported pyrites and as a by-product at some of our large

*Mining engineer, Philadelphia.

†THE IRON AGE, March 14, 1918, p. 680.

‡Rhodochrosite, carbonate of manganese, occurs in considerable quantities in some of the Montana mines at relatively great depths. It has not, however, been regarded as a commercial source of manganese and probably will not be unless our present metallurgical practices are materially changed. This comment regarding superficiality refers only to those minerals which form the bulk of our ore supply. The ores of the Tchiatouri district of Russia occur in tertiary sediments and are rather deeply covered in places. But they are essentially of superficial origin.

Engineering and Mining Journal, Jan. 22, 1921, p. 147.

Western smelters treating various metallic sulphide ores. As a consequence of this condition large industries grew up in the Atlantic States developed and attuned in technique to the almost exclusive use of these imported Spanish pyrite ores. During the stress of war these conditions were modified somewhat and considerable acid was made from Louisiana and Texas brimstone (pure sulphur). That this was simply an emergency practice is evidenced by the following statistics:

In the year 1914 one-half of the 3,800,000 tons of acid made in the United States came from Spanish pyrite. During 1917 this proportion fell to 22.9 per cent, and the acid derived from brimstone increased from 2.6 per cent in 1914 to 32.6 per cent in 1917. During 1918 the ratio changed even more, due to lack of ships and to disturbances incident to the war, being 48 per cent from American brimstone as against 7.6 per cent from Spanish pyrites; 12.7 per cent from domestic pyrite, including "coal brasses" and pyrrhotite, and 7.5 per cent from Canadian pyrite. The total amount of acid made that year was 7,450,000 tons. With the end of the war, the use of brimstone to supplement other material ceased almost immediately.*

This country possesses no great pyrite deposits comparable with those in Spain. There are some small deposits in Virginia and one or two of the other Southern States, besides a large deposit of pyrrhotite in Grayson County, Virginia, which under the stimulus of the war contributed all together a large part of the 12.7 per cent of the total production from pyrite for 1918. These figures give some idea of the size of the sulphuric acid industry in the United States and also indicate how seriously it would be affected if the cost of the Spanish ores were greatly increased by a heavy import duty. To be sure, it can be made of American brimstone, which is, or ought to be, a very cheap commodity, and as the cost of producing the acid is about the same whether made from pyrite or brimstone, it would not be a serious matter to the country were importations of Spanish pyrite to cease altogether, for our resources of brimstone are enormous. Some of the large acid plants, however, would be greatly inconvenienced and be placed at a very heavy expense in changing their plants to the use of brimstone. Moreover, there is not enough domestic pyrite to supply their needs and in any event it would cost more than the imported.

Magnesite and Graphite

Of magnesite and graphite we have in this country very large deposits and were their production protected from foreign competition by an adequate import duty, they would be much more extensively developed than at present, although there is even now a moderate tariff on magnesite. Our graphite deposits, while very extensive, are in richness much inferior to those in Ceylon. Consequently, our crude graphite in most cases must be beneficiated in order to obtain a product equal to the best imported, and so far this has proved a very difficult problem. The reasons are technical and cannot be discussed here. No doubt the difficulties can be overcome and will be, if the industry of mining and preparing graphite for market is stimulated and protected with a sufficiently high tariff on imported material. The case of magnesite and graphite is quite different from that of manganese and chromium. Of the latter our resources as compared with our needs are quite limited and should be conserved, whereas in the case of the former there is an abundance of raw material that would be exploited and utilized were foreign competition restricted or removed.

High-Speed Steel Alloys

Tungsten, vanadium and molybdenum ores have long been classed as rare minerals, and so they are. It is only since the automobile industry has become of such vast importance that the demand for ferroalloys made with them has grown to large dimensions. During the war and to some extent before, tungsten was mined in considerable quantities in this country. Since the armistice the industry has languished and in 1920 no tungsten at all was produced. The vanadium supply is a monopoly, the corporation in control importing all its ore from Peru. Molybdenum is quite a newcomer in the field of commercial alloys. It is the most common of the three above mentioned elements and occurs in considerable quantities in Canada and in a few places in the United States.

Tin and platinum have not yet been discovered in commercial quantities within our borders, and it seems unlikely that they ever will be, although it must be remembered that the mineral cassiterite, the common tin oxide, is probably known to very few American prospectors and might fail of recognition when found. Platinum is practically non-existent in the United States, and is a quite rare metal anywhere. Of course Alaska, the only large area of the United States not pretty thoroughly prospected, may contain treasures of a mineral character at present wholly unsuspected.

Nickel

No nickel ore is known to be mined as such in the United States, but an equivalent of several hundred thousand pounds of metallic nickel is understood to be obtained annually as a by-product in the electrolytic refining of copper. It is impossible, however, to know how much of this nickel was derived from copper ores of domestic origin, and how much from foreign ores. The great bulk of our nickel supply is imported as matte from the smelters of the Sudbury mines in Ontario, Canada. It is refined in this country, but of late years the International Nickel Co. has erected large refineries in Canada.

The question of import duties on ores of which we have a great abundance in the United States, such as copper, zinc, lead and iron, cannot be considered in this paper. Moreover, they are not classed as "war minerals," the subject to which these comments are confined.

Tariffs are a phase of taxation and taxation is a proper function of government. The wiser the taxation the better and happier the government. Tariff taxation is admittedly a very complex and contentious subject, usually vexatious to all and satisfactory only to those whose selfish interests are directly benefited by it. Aside from the abnormalities of war conditions, it is undeniable we are taxed too much, national, state and municipal. Such a condition is attributable justly to no other cause than neglect on the part of the voter. Men who make their living in what for want of a better word we call politics are not necessarily dishonest. From my own experience with them I judge the great majority are honest according to their lights. They are certainly more honest than their predecessors of the previous generation, which means we are now getting, on the whole, better government. The trouble is that the men who get into public office are below the average efficiency now acceptable and successful in ordinary business. And if ordinary business were conducted as badly as public affairs, it would mean bankruptcy. This statement will be called trite, but it cannot be too often reiterated.

The Policy of Protection

In the past the soundness of our protective policy has been demonstrated over and over again; we have no quarrel with it as a policy. But it is such a complex question, so involved in technicalities it ought to be removed as far as possible from political influences. Of far greater importance than almost anything else in our national life is the question of the conservation of our natural resources, especially those closely relating to national defense. To consume the small amounts of certain minerals of which we possess a very limited supply, and stimulate their production by needlessly taxing ourselves, in the face of the fact that similar minerals can be imported much more cheaply and of as good if not better quality, would seem to be about as unsound political economy as can be imagined. Minerals, unlike the forests, do not reproduce themselves; once consumed they are gone for all time. Unfortunately we cannot, as a general thing, accurately determine their limitations; hidden often deep in the earth, their metes and bounds can never be known to

*Bulletin 184, Bureau of Mines, p. 24.

a certainty until they are exhausted. Their general abundance, however, can be pretty accurately estimated by mining engineers, and when the public is warned of these dangerous limitations, as in the cases of some of the minerals cited in this article, heed should be given the engineer rather than to those who may be interested solely in local mining operations, even though they honestly believe there is an abundance of the minerals they desire to produce under a protective tariff in competition with cheaper and more plentiful foreign ores.

The general broad principle that what is best for the whole country should be the law will be admitted by every one. What that best should be is likely to be difficult to determine, and can be justly decided only by those familiar with the whole country, its natural resources as well as local industrial and social conditions.

Obviously such complicated problems are difficult to solve by a legislative body as large as Congress, subjected as it ever must be to all sorts of cross currents, conflicting interests and local political influence and prejudices. If our high standards of comfort and living are to be maintained in this country a protective tariff is absolutely necessary. The point is to have it applied with the greatest wisdom and skill, and that can only be done by experts devoting their whole time to the subject.

Testing Materials Meeting

The report of the executive committee of the American Society for Testing Materials, read at the annual meeting of the society at the session of Tuesday evening, June 21, at the New Monterey Hotel, Asbury Park, N. J., indicated the numerous lines of co-operative effort which committees of the society are pursuing with various engineering, technical and scientific organizations. It appeared also that the year which was brought to a close has been noteworthy for the continued activity on the part of the standing committees. In fact it was stated that doubtless there has never been a more active year in the history of the society's committee work. There was presented at the meeting a total of 32 committee reports comprising approximately 650 pages. The sessions devoted to steel, wrought iron, cast iron and non-ferrous metal are to take place on Friday, June 24.

The society had a net increase of 154 members and the total membership at the annual meeting this year was 2908. Two new committees were organized in the year; one, on screen wire cloth, under the chairmanship of R. W. Woodward, assistant physicist Bureau of Standards, Washington, and one on nomenclature and definitions, under the chairmanship of Cloyd M. Chapman, consulting engineer, New York. At the request of committees A-1 on steel and C-2 on reinforced concrete, the executive committee authorized the formation of a special committee on tests of deformed steel concrete reinforcement bars. The executive committee is looking into the possibility of organizing committees on paper and leather; the latter subject having arisen with special reference to leather belting. Suggestions for organizing committees on pyrometry and on temperature measurements were referred to committee E-1 on methods of testing for recommendations.

An increase in sales of the standards and an increased use of them by engineers and architects was reported. The printing of Spanish-English editions of some 62 specifications and their distribution in this way was completed in 1919. Since that time the same specifications have been translated into French. Complimentary copies have been sent to commercial attaches in foreign countries and to the foreign embassies and legations at Washington.

It was decided to appoint a standing committee on materials engineering education, which is to include not only men engaged in the profession of engineering education who are able to devote the necessary time to committee work, but also men who are practicing engineers or who represent firms utilizing the services of men specializing in materials engineering, in order that their practical knowledge of the development of this specialty can be contributed to the study of the problem. The society is co-operating with the division of engineering of the National Research Council in several research projects, including high-speed tool steel, heat treatment of steel, and magnetic analysis. The division is also represented on the joint committee on investigation of phosphorus and sulphur in steel. The society continued its representation on the American Bureau of Welding, which was formed some time ago as a research bureau of the American Welding Society. A comprehensive program covering this field has been announced, including consideration of specifications for steel to be welded.

Co-operation with the Society of Automotive Engineers, the American Society for Steel Treating, and the division of engineering of the National Research Council in the study of matters relating to heat treatment of iron and steel was arranged through committee A-4 on heat treatment of iron and steel.

Officers Elected

C. D. Young, who for some years was chairman of committee A-1 on steel, was elected president for the next society year. Guilliaem Aertsen, Midvale Steel & Ordnance Co., Nicetown Works, Philadelphia, was elected vice-president. For members of the executive committee, the elections were as follows: Florus R. Baxter, chief of testing laboratory, Vacuum Oil Co., Rochester, N. Y.; E. D. Boyer, cement expert, Atlas Portland Cement Co., New York; F. M. Farmer, chief engineer Electrical Testing Laboratories, New York, and W. H. Fulweiler, chief chemist, United Gas Improvement Co., Philadelphia.

Freight Traffic Increasing

Freight traffic is increasing faster than it did in 1919 despite the agitation that freight traffic cannot revive under the present rates, says the *Railway Age*. Although business declined to a lower point in 1921 than in 1919, at the end of May, 1921, the railroads were handling more freight than in 1919. In the last two weeks of May, 1919, total car loadings were 1,441,084, while in the last two weeks of May, 1921, they were 1,455,567. The number of carloads of freight shipped in the week ended May 28 was 787,237, an increase of 19 per cent over February, but 11 per cent less than at the same time last year and 20 per cent less than last October.

The National Sheet Metal Contractors' Association of Buffalo was one of the organizations investigated by the Lockwood legislative committee investigation into building conditions in Buffalo. James W. Farrell, Farrell & Curry, sheet metal workers, who is secretary and treasurer of the association, agreed to the proposal made by Samuel Untermyer, counsel for the committee, that the organization arrange to abandon alleged improper practices. The committee suggested to Buffalo authorities that they readvertise for bids for the construction of eleven new schools.

The New England sales district office, North Works, American Steel & Wire Co., Worcester, Mass., has been abolished and a Worcester sales office established in its place to handle Worcester city district and the metropolitan district, centering in Boston, business only. The rest of the New England territory will be handled from New York. A. R. Webb will be in charge of the Worcester city office.

The Ford Motor Co. recently produced motor car No. 5,000,000 at the Highland Park plant, and it may be placed along side the first Ford car in the Ford museum. It is estimated that the total output since the first car was built represents a value of $2,500,000,000, at an average price of $500 each.

A High Production Rate for Steel in 1920

Plates, Sheets and Structural Shapes Made a New Record—Ingot and Castings Total Was 42,132,934 Gross Tons—Rolled Products, 32,347,863 Tons

THE statistics of iron and steel production in 1920, which have just been compiled by the American Iron and Steel Institute, make a better showing than was indicated by the monthly statistics of ingot output published through the year. Apparently the 16 per cent of the industry not represented in the monthly ingot statistics operated at a better proportionate rate than the 84 per cent.

The production of steel ingots and castings last year was 42,132,934 gross tons, a total only exceeded in 1916, 1917 and 1918. The total of steel castings was 1,251,542 tons as against 976,437 tons in 1919. The production of alloy steel ingots and castings was 1,660,292 tons, having been exceeded only in 1918 at 1,787,852 tons.

Some records were made in finished forms of steel. The total of plates and shapes was 9,337,680 tons, or nearly 2,000,000 tons more than in 1919, while the closest approach was made in the 1918 production with a total of 8,799,135 tons. Structural shapes went to a new high point at 3,306,748 tons, the previous high record having been 3,110,000 tons in 1917. The total of steel rails last year was 2,604,116 tons.

The production of wrought pipe made a new record, as indicated by a total of 3,220,289 tons of skelp—2,967,886 tons of steel and 252,403 tons of iron. The largest previous output of skelp was in 1916 at 2,927,674 tons. The production of merchant bars was 6,130,240 tons (against 4,391,624 tons in 1919), or not far from the average of 6,228,000 tons for the three big years, 1916-18.

The production of steel black plates for tinning was 1,467,389 tons, as against high records of 1,513,117

PRODUCTION OF STEEL INGOTS AND CASTINGS BY PROCESSES.

Years	Open-hearth.			Bessemer.	Crucible.	Electric.	Miscellaneous.	Total. Gross tons.
	Basic.	Acid.	Total.					
1906	9,658,760	1,321,653	10,980,413	12,275,830	127,513	.....	14,380	23,398,136
1907	10,279,315	1,270,421	11,549,736	11,667,549	131,234	.....	14,075	23,362,594
1908	7,140,425	696,304	7,836,729	6,116,755	63,631	.....	6,132	14,023,247
1909	13,417,472	1,076,464	14,493,936	9,330,783	107,355	13,762	9,185	23,955,021
1910	15,292,329	1,212,180	16,504,509	9,412,772	122,303	52,141	3,194	26,094,919
1911	14,685,932	912,718	15,598,650	7,947,854	97,653	29,105	2,844	23,676,106
1912	19,641,502	1,139,221	20,780,723	10,327,901	121,517	18,309	2,853	31,251,303
1913	20,344,626	1,255,305	21,599,931	9,545,706	121,226	30,180	3,831	31,300,874
1914	16,271,129	903,555	17,174,684	6,220,846	89,869	24,009	3,622	23,513,030
1915	22,308,725	1,370,377	23,679,102	8,287,213	113,782	69,412	1,527	32,151,036
1916	29,616,658	1,798,769	31,415,427	11,059,039	129,692	168,918	604	42,773,680
1917	32,087,507	2,061,386	34,148,893	10,479,960	126,716	304,543	495	45,060,607
1918	32,476,571	1,982,820	34,459,391	9,376,236	115,112	511,364	329	44,462,432
1919	25,719,312	1,229,382	26,948,694	7,271,562	63,572	384,452	2,952	34,671,232
1920	31,375,723	1,296,172	32,671,895	8,883,087	72,265	502,152	3,535	42,132,934

PRODUCTION OF STEEL INGOTS.

1906	9,345,212	915,310	10,260,522	12,243,229	117,170	.....	3,510	22,624,431
1907	9,912,839	890,372	10,803,211	11,634,276	121,001	.....	989	22,559,477
1908	6,985,420	539,532	7,524,952	6,096,196	55,360	.....	519	13,677,027
1909	13,111,467	781,429	13,892,896	9,296,969	94,672	13,456	786	23,298,779
1910	14,858,353	782,805	15,641,158	9,354,437	107,671	50,821	....	25,154,087
1911	14,419,306	608,153	15,027,459	7,890,753	83,623	27,227	417	23,029,479
1912	19,197,504	712,371	19,909,875	10,259,151	100,967	14,147	542	30,284,682
1913	19,884,465	805,250	20,689,715	9,465,200	103,655	20,973	587	30,280,130
1914	15,936,985	633,382	16,570,367	6,154,964	78,683	15,458	312	22,819,784
1915	21,975,622	968,148	22,943,770	8,194,737	99,026	46,348	331	31,284,212
1916	29,011,146	1,227,832	30,238,978	10,916,248	120,341	126,048	302	41,401,917
1917	31,528,939	1,406,798	32,935,737	10,320,688	122,882	239,632	261	43,619,200
1918	31,970,691	1,347,870	33,318,561	9,215,392	113,782	403,068	219	43,051,022
1919	25,405,347	780,827	26,186,174	7,172,743	62,563	272,942	373	33,694,795
1920	30,926,393	759,102	31,685,495	8,778,107	70,536	346,956	298	40,581,392

PRODUCTION OF STEEL CASTINGS.

1906	313,548	406,343	719,891	32,601	10,343	.....	10,870	773,705
1907	366,476	380,049	746,525	33,273	10,233	.....	13,086	803,117
1908	155,005	156,772	311,777	20,559	8,271	.....	5,613	346,220
1909	306,005	295,035	601,040	33,814	12,683	306	8,399	656,242
1910	433,976	429,375	863,351	38,335	14,632	1,320	3,194	940,832
1911	266,626	304,565	571,191	57,101	14,030	1,878	2,427	646,627
1912	443,998	426,850	870,848	68,750	20,550	4,162	2,311	966,621
1913	480,161	450,055	910,216	80,506	17,571	9,207	3,244	1,020,744
1914	334,144	270,173	604,317	65,882	11,186	8,551	3,310	693,246
1915	333,103	402,229	735,332	92,476	14,756	23,064	1,196	866,824
1916	605,512	570,937	1,176,449	142,791	9,351	42,870	302	1,371,763
1917	558,568	654,588	1,213,156	159,272	3,834	64,911	234	1,441,407
1918	805,880	634,950	1,140,830	160,844	1,330	108,296	110	1,411,410
1919	313,965	448,555	762,520	98,819	1,009	111,510	2,579	976,437
1920	449,330	537,070	986,400	104,980	1,729	155,196	3,237	1,251,542

In 1920, 205 works in 24 States and the District of Columbia made steel ingots, against 198 works in 26 States and the District of Columbia in 1919.

In 1920, 326 works in 33 States, the District of Columbia, Alaska, and the Canal Zone, Panama, made steel castings, against 310 works in 32 States, the District of Columbia, and the Canal Zone, Panama, in 1919.

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS.

Years.	Ingots.	Castings	Total.	Years.	Ingots.	Castings.	Total.
1909	158,978	23,002	181,980	1915	923,251	97,896	1,021,147
1910	538,462	29,357	567,819	1916	1,306,157	56,458	1,362,615
1911	425,169	56,290	481,459	1917	1,576,806	67,529	1,644,335
1912	689,392	103,109	792,501	1918	1,721,367	66,485	1,787,852
1913	625,430	88,927	714,357	1919	1,435,816	45,372	1,481,188
1914	577,107	69,846	646,953	1920	1,591,939	68,353	1,660,292

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS, BY PROCESSES, GROSS TONS, 1920.

Processes.	Ingots.	Castings.	Total.
Open-hearth steel—basic	1,116,923	2,326	1,119,249
Open-hearth steel—acid	129,832	34,565	164,397
Bessemer steel	81,809	19,745	101,554
Crucible steel	29,513	7	29,520
Electric and miscellaneous steel	233,862	11,710	245,572
Total	1,591,939	68,353	1,660,292

In 1920 there were 152 works in 25 States and the District of Columbia which made alloy steel ingots or castings.

TOLTAL PRODUCTION OF ALL KINDS OF FINISHED ROLLED IRON AND STEEL, 1887–1920

Years.	Iron and steel rails.	Plates and sheets.	Nail plate.	Wire rods.	Structural shapes.	All other finished rolled products.	Total. Gross tons.
1887	2,139,640	603,355	308,432	.....	.....	2,184,279	5,235,706
1888	1,403,700	609,827	289,891	279,769	.....	2,034,162	4,617,349
1889	1,522,204	716,496	259,409	363,851	.....	2,374,968	5,236,928
1890	1,885,307	809,981	251,828	457,099	.....	2,618,660	6,022,875
1891	1,307,176	678,927	223,312	536,607	.....	2,644,941	5,390,963
1892	1,551,844	751,460	201,242	627,829	453,957	2,579,482	6,165,814
1893	1,136,458	674,345	136,113	537,272	387,307	2,104,190	4,975,685
1894	1,021,772	682,900	108,262	673,402	360,305	1,795,570	4,642,211
1895	1,306,135	991,459	95,085	791,130	517,920	2,487,845	6,189,574
1896	1,122,010	965,776	72,137	623,986	495,571	2,236,361	5,515,841
1897	1,647,892	1,207,286	94,054	970,736	583,790	2,497,970	7,001,728
1898	1,981,241	1,448,301	70,188	1,071,683	702,197	3,239,760	8,513,370
1899	2,272,700	1,903,505	85,015	1,086,398	850,376	4,146,425	10,294,419
1900	2,385,682	1,794,528	70,245	846,291	815,161	3,575,536	9,487,443
1901	2,874,639	2,254,425	68,850	1,365,934	1,013,150	4,772,329	12,349,327
1902	2,947,933	2,665,409	72,936	1,574,293	1,300,326	5,383,219	13,944,116
1903	2,992,477	2,599,665	64,102	1,503,455	1,095,813	4,952,185	13,207,697
1904	2,284,711	2,421,398	61,601	1,699,028	949,146	4,597,497	12,013,381
1905	3,375,929	3,532,230	64,542	1,808,688	1,660,519	6,398,107	16,840,015
1906	3,977,887	4,182,156	54,211	1,871,614	2,118,772	7,383,828	19,588,468
1907	3,633,654	4,248,832	52,027	2,017,583	1,940,352	7,972,374	19,864,822
1908	1,921,015	2,649,693	45,747	1,816,949	1,083,181	4,311,608	11,828,193
1909	3,023,845	4,234,346	63,746	2,335,685	2,275,562	7,711,506	19,644,690
1910	3,636,031	4,955,484	45,294	2,241,830	2,266,890	8,475,750	21,621,279
1911	2,822,790	4,488,049	48,522	2,450,453	1,912,367	7,316,990	19,039,171
1912	3,327,915	5,875,080	45,331	2,653,553	2,846,487	9,908,475	24,656,841
1913	3,502,780	5,751,037	37,503	2,464,807	3,004,972	10,030,144	24,791,243
1914	1,945,095	4,719,246	38,573	2,431,714	2,031,124	7,204,444	18,370,196
1915	2,204,203	6,077,694	31,929	3,095,907	2,437,003	10,546,188	24,392,924
1916	2,854,518	7,453,980	30,088	3,518,746	3,029,964	15,493,093	32,380,389
1917	2,944,161	8,267,616	22,864	3,137,138	3,110,000	15,585,921	33,067,700
1918	2,540,892	8,799,135	18,310	2,562,390	2,849,969	14,385,058	31,155,754
1919	2,203,843	7,372,814	12,832	2,538,476	2,614,036	10,359,543	25,101,544
1920	2,604,116	9,337,680	20,577	3,136,907	3,306,748	13,941,835	32,347,863

tons in 1917 and 1,502,690 tons in 1918. The production of tin plates and terne plates was not far from the highest at 3,218,177,730 lb., against 2,578,011,487 lb. in 1919, 3,301,624,244 lb. in 1918 and 3,387,206,564 lb. in 1917.

The production of cast iron pipe and fittings in 1920 was 886,515 net tons—775,523 tons of pipe and 110,992 tons of fittings. The total of gas and water pipe and fittings was 636,862 net tons and of soil and plumbers' pipe, 249,653 tons. The high years for cast iron pipe were 1915 and 1916, at 1,214,870 tons and 1,214,333 tons respectively.

STEEL OUTPUT DECLINING

Sheet Prices Lower—General Wage and Price Reductions Predicted

YOUNGSTOWN, OHIO, June 21.—Independent steel production in the Mahoning Valley is likely under 20 per cent this week, probably the lowest level thus far reached, while operation of the Youngstown district plants of the Carnegie Steel Co. is at 30 per cent thereby bringing the general average to about 25 per cent. Of the 51 independent open-hearth furnaces, only 16 are making steel; of the three Bessemer plants, that of the corporation alone is blowing. Twenty-six of the 105 sheet mills in the Valley are active, as compared with a low recently of 20 sheet units.

Quotations on black and galvanized sheets appear to have dipped $5 per ton below the stabilized figures of 4c. and 5c. respectively, bringing the former to 3.75c. and the latter to 4.75c. On the whole, new sheet business is light and a resumption in volume is not looked for until fall. The bulk of the current tonnage is going to automobile consumers. One interest is producing almost wholly for the Ford Motor Co., though a small proportion of its production is going to the metal furniture trade. Recent inquiries before Valley makers have been light, embracing principally common sheets and galvanized. Small orders are constantly being filled from stock and these inroads are serving to materially reduce accumulations of material in producers' warehouses. Independents, which claim they have been trying to maintain the stabilized prices, say they are getting little or no business, but that considerable tonnage is being placed with some competitors at concession prices.

Throughout the finished market, buying continues along the same indifferent lines that have marked the industry for some time. Standard merchant pipe, plates, nails and plain wire are being placed in limited volume, with less activity in strip steel, tin plate and steel bars. In arranging their schedules, makers permit tonnage to accumulate in sufficient volume to warrant four or five days' steady operation.

More Price Concessions

Indicating the growing necessities of manufacturers is the fact that price concessions are being made with more frequency. An independent interest in this territory ventures the prediction that prices will be forced from $7 to $10 per ton below the stabilized level during the year and before buying will materially revive. Further recessions in costs will therefore be necessary, inasmuch as virtually all interests state that they are now operating at a loss owing to the low volume of production. Anticipated railroad rate reduction is expected to contribute to lower costs.

It is also being conceded that wages will also recede in conformance with the general movement to a lower producing plane. This is especially likely in the Mahoning Valley where the current day labor rate in both the corporation and independent plants is 37c. per hr. An ultimate rate of from 25c. to 30c. an hr. is predicted, which would place Valley producers on a par in this respect with Eastern competitors. Insistence of bar iron makers for restoration of the 1915-1916 wage scale in the recent conference with representatives of employees at Atlantic City indicates the determination of iron and steel makers to move back toward pre-war wage levels. It would not be at all surprising if the present disagreement should result in an attempt on the part of some mills which now recognize the Amalgamated Association of Iron, Steel and Tin Workers to break away from the unions. It is claimed in some quarters that production is much more efficient in non-union mills than in union plants.

Small Sales of Pig Iron

Aside from the purchases of basic iron by the Sharon Steel Hoop Co., sales are confined to small round-lot tonnages. The last sizable transaction, involving 1000 tons, is reported to have been made at $21.50, the Sharon company purchasing the iron from the Youngstown Sheet & Tube Co. It is claimed that some producers are willing to sell basic at $21.

During the past week plate makers considered an inquiry for 2000 tons put out by tank building interests. While the miscellaneous inquiry is small, the aggregate is such as to cause an improved tone in this branch.

District steel makers expect some business from the railroads after July 1, chiefly for car repair material, which would include plates, sheets, angles channels, bolts, nuts, small beams, spikes, bars, rods, pipe, forging billets and the like. William A. Baldwin, manager of the Ohio region of the Erie, has indicated the probability of the placing of such orders, particularly for locomotive and car material. All carriers are said to have a large number of bad order cars which they are anxious to repair.

In the semi-finished market, open-hearth sheet bars have sold down $3 per ton from the nominal quotation of $39. On some business the makers have agreed to absorb the freight charges. Billets, 4 x 4-in. and larger, are quotable at $37 and slabs at $38. All skelp produced is being consumed in makers' pipe furnaces.

Prices in Italy

MILAN, ITALY, May 22.—The elections are now over. The socialists lost 33 places which reduces their seats in Parliament from 156 to 123. In Upper Italy and Central Italy they lost 43 places and from 145 deputies for these two regions they are reduced to 102. They gained in southern Italy where they had but very few seats before. This goes to show the tendency of the country against socialism. It is now the turn of southern Italy to try this fad out. Milan elected 14 socialists out of 24 deputies, but we must take in account that last time Milan and Lombardy had 18 socialist deputies.

Here are this week's prices in lires, f.o.b. Milan per 100 kg.:

	March 19	April 17	May 22	Cents per Lb. May 22
Copper, electrolytic	725	630	575	13 34
Copper sheets	1200	1100	1020	23.66
Brass sheets	1100	970	900	20.88
Brass wire	1075	950	875	20.30
Brass rods	620	580	550	13.26
Brass tubes	1250	1150	1070	24.82
Black sheets base, 4 mm.	200	160	160	3.71
Galvanized sheets, No. 20.	320	285	250	5.80
Tin plate, standard, per case	230	215	180	$9.18

The new Japanese customs tariff provides for increases in the duties on spiegeleisen, ferromanganese, iron rods and bars, wire rods, steel sheets and plates, galvanized sheets, iron tubes and pipes, spelter, locomotive engines, boilers and cranes. The duties on iron and steel have been advanced in order to help Japanese industry, but steel plates, shapes, boilers, etc., are to be admitted free of duty. It is thought that this will stimulate the shipbuilding industry, and also that before very long the local industry will be able to supply 80 per cent of the pig iron and 70 per cent of the steel requirements of the country.

NEW ORE PRICES

Reduction of One Dollar per Ton from Those of 1920—Buying Is Started

CLEVELAND, June 21.—Prices on Lake Superior ore for 1921 have been established at a reduction of $1 a ton from the 1920 price or at the prices that prevailed in 1919 by a sale of approximately 150,000 tons of various grades made June 16 by Pickands, Mather & Co. The purchaser is understood to be a Canadian steel interest. Another sale of a smaller lot was made by the same ore firm the same day, the aggregate of the two sales being close to 200,000 tons. Other sellers have accepted the prices named as the season's prices and these will be used as the bases of charges for ore delivered on long time contracts. Previous to the naming of the season's prices, a few small lot sales were made, probably not over 100,000 tons, subject to whatever prices were named for the season. Taking into account the 30c. per ton reduction in vessel rates, ore shippers have made a net reduction of 70 cents a ton.

Some of the ore firms thought that the price reduction should not exceed 50c. per ton and figures compiled recently showed that the cost of production in underground mines, based on normal operations and taking into consideration wage and lake rate reductions, would be only 50c. per ton less than last year. On the other hand, some consumers felt that in view of the general downward price tendency there should have been a deeper cut in ore prices. The consumption of 1922 ore will be very light owing to curtailed operations and to the fact that there were 27,600,000 tons of ore carried over on docks and in furnace yards at the opening of navigation May 1. However, consumers will probably use the 1921 prices largely in figuring pig iron and steel production costs, as they generally have written down their inventories on ore carried over into 1921 at from 50c. to $1.50 per ton.

Latest in 30 Years

Ore prices were fixed later this year than at any time in the last 30 years. The latest price fixing date in that period was in 1909, when prices were named May 20. However, during 1918 after prices had been fixed rather early in the season, two advances were made by the Government under wartime regulations.

Little Activity Expected

The naming of prices will probably bring very little activity in the ore market, as most consumers are expected to defer purchasing as long as they can. Some will need no additional ore and others that will have to make some small lot purchases will probably not buy before fall. The naming of prices without further delay was desired by some consumers who are taking ore on long term contracts and who became rather anxious to know what the ore was to cost them. Because they will not need the ore, a few consumers have arranged with mining companies to take no shipments on contracts this season. A small quantity of ore on deferred contracts will be shipped East, but lake shippers look for no new business from the East this season, as they cannot compete with foreign ore at present prices. At the new prices, Mesaba non-Bessemer with 51.50 iron content will cost the Eastern consumers about 15c. per unit as compared with a unit cost of 8c. to 10c. for foreign ore. This makes the average cost of lake ore delivered in the East approximately $2 a ton higher than foreign ore. Shippers have gradually scaled down their estimates of the season's movement of ore and now name 25,000,000 tons as their maximum estimate, about one-half of which will be shipped by the Steel Corporation.

Near Prices of 1917

The new prices bring ore back to within 50c. per ton of the prices that prevailed in 1917, but ore shippers call attention to the fact that the prices which the mines will actually receive this year will be less than the prices they received in 1917, taking into consideration advances in transportation and large increases in State and local taxes which will absorb the 50c. per ton difference in price over 1917. In 1917 it cost $1.73½ per ton to deliver ore to Lake Erie ports. To-day the transportation cost including unloading and war tax is approximately $2 a ton, or an increase of over 26c. per ton. It is stated that this increase together with the advance in State and local taxes since 1917 more than offsets the 50c. per ton higher ore price. This means, according to some of the shippers, that all of the ore coming from underground mines in the Lake Superior district, will be marketed this year at substantially less than the cost of production.

The higher transportation costs on ore this year as compared with 1917 are due to the advance in rail rates as the lake rates are lower, the vessel rate from the head of the lakes being 80 cents net as compared with $1 in 1917. The present 80 cent vessel rate compares with a net rate of $1.10 from the head of the lakes last year, the carrying charge on ore having recently been established at a 30 cent a ton reduction. The unloading charge was increased from 10 to 14 cents during last year with the advance in freight rates and this will probably not be reduced until rail rates are cut down. The new prices are delivered lower lake ports: Old range Bessemer, $6.45; old range, non-Bessemer, $5.70; Mesabi Bessemer, $6.20; Mesabi non-Bessemer, $5.55.

Making History on the German Destruction of French Works

An important contribution to the history of the great war is made in a pamphlet recently prepared by M. L. Bacle, president of the French Society for the Encouragement of National Industry, founded by Napoleon Bonaparte in 1801. In the more than 100 pages of the pamphlet the author describes in detail the systematic destruction by the Germans of metallurgical works located in the invaded districts of France. "Public opinion," he writes, "is often so apt to interpret such destruction as involuntary ravages which war always brings with it. Few realize that most of the works thus devastated were not on the battlefront, from which they were distant at least 30 miles, but they were robbed and destroyed as a result of administrative decision made in cold blood and executed methodically outside the field of combat." Mr. Bacle's pamphlet, which comes to us through Prof. Henry M. Howe, is fully illustrated, many of the views of the iron and steel works being identical with those which appeared in articles in THE IRON AGE shortly after the armistice, showing with what calculation various plants in France and Belgium had been stripped of their equipment, buildings in some cases being left as heaps of ruins. The author has made his record circumstantial, his intent being that no historian of the future should fail to know exactly the purpose of the German high command to cripple French industry and to prevent its being for many years a serious competitor.

Steel Output of Czecho-Slovakia

During 1920 the output of steel in Czecho-Slovakia was 972,976 tons, of which 163,663 tons, or 16.82 per cent, was Bessemer and basic; 792,794 tons, or 81.48 per cent, open hearth, and 16,519 tons, or 1.7 per cent, electric. Although the output was 28.3 per cent greater than in 1919 it was less than in the pre-war year 1913, and much less than during the war, as the following figures show:

Year	1913	1917	1918	1919	1920
Tons	1,257,031	1,601,079	1,019,032	786,022	972,976

Effective Saturday, June 18, rail freight rates on articles of iron and steel from Chicago to the Pacific coast and destined for export from Pacific ports, was reduced to 71c per 100-lb., a reduction of 9c per 100-lt. from the former rate.

The strike of the building trades unions in Moline, Rock Island and East Moline, Ill., and Davenport, Iowa, was recently settled when the men returned to work, accepting a scale of 87½ cents an hour.

Exports Below One-Fourth Those of May, 1920

Outward Movement of Iron and Steel in May Was Only 104,072 Tons—The Lowest Figure Since August, 1914—Imports Rise

WASHINGTON, June 21.—With iron and steel exports for May, 1921, totaling only 104,072 gross tons, valued at $41,365,886 (less than one-fourth the tonnage of May, 1920), they struck a slump below any that has taken place since August, 1914, when the outbreak of the European war temporarily demoralized industry in the United States. In that month the exports were only 85,598 tons. In April of this year exports totaled 162,592 tons, valued at $49,609,605. For the 11 months ending with May of the current year, however, the exports exceeded those for the same period ending with May, 1920, the respective aggregates being 4,128,295 tons, valued at $998,023,452, and 3,820,271 tons, valued at $843,763,514, a fact which is accounted for by the extreme activity of the iron and steel industry during the first nine months of the fiscal year 1921.

Imports of Iron and Steel

	Gross Tons			
	May		Eleven Months May	
	1920	1921	1920	1921
Ferromanganese	3,981	75	33,279	42,932
Ferrosilicon	1,538	182	15,358	6,841
Pig iron	14,295	15,276	115,228	60,471
Scrap	5,851	824	189 956	81,285
Bar iron	76	314	2,717	3,782
Structural steel	64	72	1,022	1,322
Billets, without alloys	1,226	....	67,465	750
All other billets	370	117	3,375	3,165
Steel rails	7,359	6,254	17,928	34,998
Sheets and plates	7	359	1,189	1,548
Tin and terne plates	38	14	350	477
Wire rods	171	11	859	4,588
Total	34,976	23,498	448,726	242,159
Manganese ore and oxide	56,586	54,663	243,572	665,601

Exports of Iron and Steel

	Gross Tons			
	May		Eleven Months May	
	1920	1921	1920	1921
Ferromanganese	134	...	2,099	3,335
Ferrosilicon	34	2	367	525
Pig iron	12,864	2,541	228,555	123,992
Scrap	19.576	4,146	57 480	178,891
Bar iron	3,573	341	33,262	38,433
Wire rods	9,436	2,642	96,689	61,075
Steel bars	62,982	5,564	529,859	460,705
Billets, ingots, blooms	16.370	749	258,955	81,443
Bolts and nuts	3,628	1,286	31,849	35 988
Hoops and bands	5,672	915	41 700	37,128
Horseshoes	342	12	2,317	1,472
Cut nails	344	28	3,790	3,433
Wire nails	7,853	709	57,873	4,356
All other nails, including tacks	1,178	163	8 082	9,439
Cast pipe and fittings	6,190	4,124	42,651	42,429
Welded pipe and fittings	25,444	2,441	203,410	418,086
Radiators and cast house boilers	464	192	6,407	4,683
Railroad spikes	1,371	289	15,559	13,520
Steel rails	58,497	23,492	504,348	529,252
Galvanized sheets and plates	7,490	3,042	88,859	90,211
All other sheets and plates	2,510	1,264	30,305	24,451
Steel plates	74,710	18,518	660,273	753,222
Steel sheets	16,409	7,686	135,941	145,533
Ship plates, punched and shaped	3,431	419	25,814	30,138
Structural steel	32,680	17,926	305,208	508,424
Tin and terne plates	19,426	1,593	188,692	175,551
Barb wire	10,489	1,027	110,769	85,180
All other wire	17,262	2,961	149,158	163,328
Total	420,359	104,072	3,820,271	4,128,295

But while exports continue to show declines which set in in February, imports showed a remarkable increase in May, totaling 23,498 tons, valued at $3,144,643, as compared with only 7027 tons, valued at $2,779 203 for April, and the latter was a big increase over March, when imports totaled 5323 tons, indicating that, despite the world-wide depression in industry, foreign makers of iron and steel are making inroads on the United States market. For the 11 months ending with May, 1921, imports aggregated 242,159 tons, valued at $41,723,676, as compared with 448,726 tons, valued at $32,155,572, for the 11-month period ending May, 1920.

Along with the drop in the outward movement of iron and steel products, machinery exports showed a decline, though a comparatively small one, in May, when their value was $20,395,541, as compared with $24,234 901 in April. When compared with May of last year, the decline in value was more than 50 per cent, the total then having been $43,512,416. For the 11 months ending with May, 1921, and May, 1920, the totals were $419,452,412 and $360,904,519, respectively.

The revised plan put into effect in gathering import and export figures, looking both to more accuracy and speed, is declared by officials of the Bureau of Foreign and Domestic Commerce to be bringing the desired results, yet it is observed that there still are discrepancies. These are noted in the iron and steel figures because the total and some individual imports and exports for the 10 months ending with April, when added to those for May, do not balance with the totals given in the advance compilations, which, however, are always subject to revision. Approximately, however, they are correct.

Exports, January, 1919, to May, 1921, Inclusive

	Gross Tons		
	All Iron and Steel	Pig Iron	Semi-finished Material
January, 1919	360 456	35,793	11.594
February	234,793	20,178	10,407
March	344.506	22,054	8,176
April	408,204	16,300	11,488
May	447,050	32,233	20,771
June	544,580	39,540	46,016
July	287,823	38,373	21,318
August	396,743	36,071	36,162
September	363,505	18,991	37,513
October	302,456	14,108	20,713
November	295,045	21,429	13,211
December	254,676	14,612	21,538
Total	4,239,837	309,682	258,907
January, 1920	333,601	18,468	19,937
February	308,185	15,739	22,693
March	417,216	22,740	30,444
April	395,120	14,608	19,032
May	420,359	13,032	16,370
June	402,707	17,075	29,811
July	458,866	29,647	17,243
August	431,484	22,645	20,920
September	409,200	22,724	18,113
October	452,015	17,296	11,853
November	434,297	13,929	7 042
December	498,765	10,055	3,415
Total	4,961,851	217,958	216,873
January, 1921	547,394	3,710	315
February	393,328	1,307	92
March	230,635	2,320	1,023
April	162,592	1,234	678
May	104,072	2,541	749
Five months	1,438,021	11,112	2,857

Among products showing the sharp declines in May were welded pipe, with a total of only 2441 tons as compared with 36,101 tons in April; steel rails, with 23,492 tons and 31,392 tons, respectively; and steel plates, with 18,518 tons and 29,007 tons, respectively. The greatest increases in imports were made in pig iron, with 15,276 tons in May as compared with 2781 tons in April and in steel rails, with 6254 tons in May and 298 tons in April.

Movement of the products exported in the 11-month period was directed to all quarters of the globe. Of the 42,429 tons of cast pipe exported, Mexico took 1557 tons, Cuba 1072 and the Dutch East Indies 3764. The welded pipe exports of 418,086 tons went to such countries as Mexico, 149,489 tons for the 11 months, and

9419 tons in May; Dutch East Indies, 35,455 tons and 3858 tons, respectively; Japan, 25,163 tons and 3350 tons, respectively; Peru 18,741 tons and 5196 tons, respectively, and the United Kingdom, 15,060 tons and 1529 tons, respectively. Steel rails for the 11-month and one-month periods, respectively, were exported, among others, to the following countries: Dominican Republic, 79,136 and 1487 tons; Dutch East Indies, 53,779 and 2015 tons; Japan, 52,629 and 5750 tons; Kwantung, 40,186 and 6543 tons, and Argentina, 24,177 and 1800 tons. Galvanized sheet and plate exports to Canada totaled 22,505 and 1422 tons; Cuba, 8587 and 125 tons, and Argentina, 7575 and 111 tons.

Machinery Exports

	May 1920	May 1921	Eleven Months Ending May 1920	May 1921
Adding machines	$ 617,135	$ 205,014	$ 3,801,142	$ 5,738,695
Air-compressing machinery	553,808	205,139	3,964,091	5,382,697
Brewers' Machinery	26,260	49,137	289,754	449,557
Cash Registers	708,677	169,553	5,138,433	3,640,007
Parts of	48,123	28,344	328,255	370,372
Concrete mixers	72,217	25,116	461,487	982,924
Cotton gins	57,595	14,457	264,615	279,779
Cream separators	104,789	70,089	1,005,227	769,685
Elevators and elevator machinery	203,941	155,842	1,836,143	1,935,319
Electric locomotives	491,585	274,511	1,464,157	572,982
Gas engines, stationary	108,835	17,795	752,275	578,371
Gasoline engines	4,062,161	531,963	30,225,453	22,826,66 7
Kerosene engines	587,312	133,094	7,518,222	6,640,666
Steam engines	6,172,915	2,796,075	41,872,455	46,064,582
All other engines	798,849	200,372	3,049,892	3,755,287
Boilers	607,567	236,678	6,042,322	8,684,615
Boiler tubes	385,661	155,100	3,981,880	6,448,841
All other parts of engines	1,821,349	766,249	19,979,586	19,650,065
Excavating machinery	9b,773	348,33b	1,283,065	2,632,008
Milling machinery, flour and grist	145,402	247,709	1,521,983	2,180,176
Laundry machinery	129,466	79,366	1,031,168	1,082,832
All other	53,640	14,709	442,139	808,977
Lawn mowers	41,759	30,032	342,037	554,986
Lathes	829,434	269,835	8 068,936	ɔ,24ɛ,550
Other machine tools	1,318,478	2ɔ4,326	11,823 124	9,793,161
Sharpening and grinding machines	276,057	82,183	3,976,075	2,ɔ1ɔ,999
All other metal working machinery	1,919,421	6ɔ9,627	21,65ɔ,433	15,398,497
Meters, gas and water	91,050	4ɔ,910	686,065	732,130
Mining machinery, oil well	ɔ04,085	1,039,667	3,775,884	10,,73,031
All other	630,975	688,326	7,866,ɔ26	9,14ɪ,903
Paper mill machinery	144,049	157,993	2,500,825	3,453,677
Printing presses	806,683	626 133	5,583,618	10,026,628
Pumps and pumping machinery	1,155,128	743,498	9,487,253	1ɔ,976,426
Refrigerating and ice making machinery	255,111	71,850	2,177,744	3,288,132
Road making machinery	187,227	109,995	1,056,048	1,100,736
Sewing machines	1,657,929	631,809	13,428,356	10,796,308
Shoe machinery	257,039	88,904	2,468,790	2,691,430
Sugar mill machinery	92ɔ,740	92ɔ,866	14,461,438	27,511,937
Textile machinery	1,765,196	1,387,118	9,887,455	12,468,134
Typesetting machines	572,235	263,911	3 578,925	4,369,877
Typewriting machines	3,419,157	757 192	23,534,280	18,143,716
Windmills	178,887	111,941	1,274,530	2,678,392
Wood working machinery, saw mill	60,710	90,130	844,619	1,337,513
All other	312,154	- 193,488	3,065,039	3,725,058
All other machinery and parts of	8,347,850	4,431,070	72,011,645	94,255,088
Total	$43,512,416	$20,395,541	$360,904,519	$419,452,412

Plates, which represented the greatest single item of export for the 11 months, amounting to 753,222 tons, went in largest quantities to Canada, 179,423 tons and 4122 tons in May; Italy, 45,180 and 3746 tons, and Australia, 35,963 and 2689 tons. Some of the sheet exports of 145,533 tons for the 11 months and 7686 tons for May, were shipped to Canada, 56,039 and 2002 tons, and Japan, 21,183 and 1596 tons. Structural steel exports of 508,424 tons for the 11 months went to Canada, 111,787 and 1996 tons; British India, 55,599 and 2489 tons; Brazil, 48,849 and 925 tons, and Italy, 17,618 and 1400 tons. Tin plate exports of 175,551 tons for the 11 months were shipped to Canada, 32,597 and 2271 tons; Japan, 24,937 and 7800 tons; Brazil, 13,436 and 59 tons, and China, 12,052 and 26 tons.

The United Kingdom was the heaviest buyer of metal working machinery during the 11 months, taking equipment of this kind valued at $6,878,182. France came second, the value of this class of exportations to that country being $5,109,284. These two countries in May took metal working machinery valued at $180,365 and $385,908, respectively. Other countries taking large requirements of this machinery for May and the 11-month period, respectively, were Japan, $88,073 and $3,517,068; Canada, $99,596 and $3,194,300, and British India, $132,707 and $1,433,976.

Steam engines to the number of 190, valued at $2,796,075, were exported in May and 2738, valued at $46,064,582, for the 11-month period. Mexico took 62, valued at $1,433,280 in May and 151, valued at $3,124,025, for the 11 months, and Cuba took 7, valued at $193,891 in May and 299, valued at $9,226,789 for the 11 months.

First Census of Machine Tools

WASHINGTON, June 21.—Based on reports from 403 establishments, a preliminary statement of the Bureau of Census, issued yesterday, shows that the value of machine tools manufactured in 1919 was $212,225 000. No comparative figures are given, because in preceding census returns machine tools were not segregated, being classed in the enormous catch-all of "foundry and machine shop products."

Of the 403 establishments making returns to the Bureau, 102 were located in Ohio, 46 in Massachusetts, 33 in Connecticut, 32 in Pennsylvania, 31 in Michigan, 29 in New York, 28 in Illinois, 24 in Wisconsin, 15 in Indiana, 14 in New Jersey, 13 in Rhode Island, 7 in Kentucky, 6 in Vermont, 5 each in Minnesota and Missouri, 3 each in Maine and New Hampshire, 2 in California, and 1 each in Delaware, Iowa, Kansas, Maryland and Washington.

The statistics are summarized and subdivided as follows:

Lathes:		
Engine	$22,630,000	
Turret	10,141,000	
Bench and other	4,094,000	
		$36,865,000
Milling machines:		
Plain	$6,470,000	
Universal	6,025,000	
Vertical	2,370,000	
Automatic	1,232,000	
Other	2,776 000	
		18,873,000
Grinding machines:		
Plain	$11,600,000	
Universal	2,066,000	
Other	1,725,000	
		15,391,000
Drilling machines:		
Radial	$5,702,000	
Multiple spindle	1,999 000	
Sensitive	1,975,000	
Upright	1,754,000	
		11,430,000
Screw machines:		
Automatic	$7,076,000	
Hand	3,159,000	
		10,235 000
Boring machines:		
Horizontal	$4,438,000	
Vertical	4,330,000	
		8,768,000
Planers		8,129,000
Presses:		
Punching	$5,400,000	
Other	957,000	
		6,357,000
Gearing cutting machines		6,257,000
Hammers:		
Pneumatic	$3,070,000	
Other	1,882,000	
		4,952,000
Shapers		4,231,000
Pipe machines		3,178,000
Shears		1,566,000
Broaching machines		1 395,000
Bending machines		942,000
Portable tools		10,908,000
All other machine tools		26,075,000
All other products		36,673,000

Pittsburgh Coal Producers Oppose Passage of Frelinghuysen Bill

Coal producers of the Pittsburgh, Connellsville and Uniontown districts are showing very strong opposition to the Frelinghuysen bill introduced recently in the Senate by Senator Frelinghuysen, which requires coal operators to furnish detailed information as to the production, distribution and prices in the coal industry. Senator David Elkins of West Virginia, a very strong supporter of President Harding, called upon him last week and told him that he could not possibly support this measure.

The National Coal Association has also adopted resolutions against the passage of the Frelinghuysen bill.

At a special meeting of the Chamber of Commerce held in its rooms in Pittsburgh, Monday, June 20, Tracy W. Guthrie, president of Hillman Coal & Coke Co., Pittsburgh, made an address opposing the passage of this bill.

Iron and Steel Markets

USERS SELL STEEL

Manufacturing Consumers Turning Their Stocks Into Cash

Reduction of $1 in Lake Superior Ore—France Selling American Steel Products Here

In many lines of steel consumption business seems to have adjourned for the summer, but meanwhile liquidation of steel products in the hands of users is proceeding in a most unusual way. Practically all large manufacturing consumers have turned jobbers and are selling off bars, plates, structural shapes, or whatever they have on hand, at prices close to the warehouse basis.

Thus, while the mills are being called on for less steel than at any time this year, the process of cleaning up all accumulated rolled products is going on, against a day when the country will be more nearly bare of steel than in many years.

Added to the steady stream of material thus coming on the market from consumers, there is the shipment back to this country of some of the steel and considerable quantities of small tools, hardware, and building equipment sold in 1919 at a job lot price by the United States Army to the Government of France. Its resale in this country was never dreamed of, but now it is coming at prices, in the case of tools, about one-third below the domestic market. A number of sales from these stocks have been made in New England. Another hang-over from the war is 300,000 tons of finished steel, chiefly plates and shapes, which the Shipping Board is planning to put upon the market.

The operation of blast furnaces and steel works is slightly below the rate of last week. In the past two months the Steel Corporation's ingot production seems to have fallen off more relatively than that of the leading independent companies. The Carnegie Steel Co. has blown out another blast furnace and now has only 14 in operation out of 59.

There is no longer any strict adherence to the prices announced by the Steel Corporation as effective April 13. Reports have gone through the trade that a formal announcement of lower prices would be made July 1. However, market developments appear to be making any such formality unnecessary. All producers are meeting competition as it develops.

The market on bars and structural shapes is now about 2c., while 1.90c. for plates, or $6 per ton below the April 13 price, is not uncommon. In the Chicago market the weakness in bars is more pronounced. Sheets are now about $5 per ton below the April schedule and bolt and nut discounts have been revised downward.

The Lake Superior ore price for 1921 is considered established by the sale of 150,000 tons to an Ontario steel interest at a reduction of $1 per ton from the 1920 basis. Another sale of 50,000 tons at a like reduction is also reported. Buying of Lake ores for this year will be light, as 27,600,000 tons was on dock or in furnace yards on May 1. The new price means a heavy depreciation in ore inventories, but in many cases 50c. to $1 a ton was written off on ore carried over into 1921 and the pig iron market has long anticipated the reduction in ore.

Automobile companies look for some check in July to the sagging which started in May and caused the cuts in their prices. With no decided change this year the expected trend is toward betterment.

Reports persist that the railroads are getting ready to repair cars, particularly grain cars, which are in a deplorable state, but nothing of this has developed as yet in the steel market.

More tank work is in prospect. For 50 tanks for the Sinclair company 7500 tons of plates will be required and for 25 tanks for the Standard Oil Co. 3500 tons of plates will be needed.

Pig iron prices have again declined 50c. at Chicago and from 50c. to $1 at Pittsburgh, while in the Chicago territory resale iron is going at even lower prices. In other parts of the country declines have not been so definitely determined, but the market is weak.

The volume of business done in May in fabricated steel work, 50,800 tons, was not much below that of March and April, the average for the three months being 53,000 tons.

Iron and steel exports for May were 104,072 gross tons. Since the January movement of 547,000 tons there have been successive monthly decreases of 30 to 40 per cent. Last month's exports were less than one-fourth of those for May, 1920. Iron and steel imports in May, 23,498 tons, were the highest since November, but only 60 per cent of the 1919-1920 monthly average.

Exports of machinery in May were valued at $20,396,000, or one-half of the average for the 10 preceding months in the fiscal year.

For Chinese roads 102 locomotives are wanted in addition to the 42 recently bought. Oriental rail requirements are conspicuous in export negotiations.

Pittsburgh

PITTSBURGH, June 21.

A sale of 65,000 tons of ore has been made by a Cleveland interest to the Algoma Steel Co., Sault Ste Marie, Canada, at prices $1 per ton under last year's prices. Other ore interests say they have no inquiry, but will meet this reduction of $1 if any business is offered them.

The tendency in prices is still downward, and in the past week pig iron declined 50c. to $1 per ton. Furnace operations are being steadily restricted, the Carnegie Steel Co. having blown out another furnace and now has only 14 out of 59 in operation. Prices on sheets, scrap and coke are lower, although there is hardly enough business going in anything to induce buyers to cut prices. There seems to be no doubt that with about a 20 per cent rate of operation of blast furnaces and steel works, consumption of pig iron, semi-finished steel and finished steel products is larger than production.

Pig Iron.—Even the small amount of business that is being placed in pig iron has induced some producers or dealers to cut prices, and this week Bessemer, basic, and mill iron are at least 50c. per ton lower, while

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	June 21, 1921	June 14, 1921	May 24, 1921	June 22, 1920
No. 2X, Philadelphia‡	$25.50	$25.50	$25.50	$47.15
No. 2, Valley furnace†	*21.50*	22.50	23.00	45.00
No. 2 Southern, Cin'ti†	26.50	26.50	26.50	45.60
No. 2, Birmingham, Ala.†	22.00	22.00	22.00	42.00
No. 2, foundry, Chicago*	*20.50*	21.00	23.00	43.00
Basic, del'd, eastern Pa	25.00	25.00	25.00	44.80
Basic, Valley furnace	*20.50*	21.00	21.75	44.00
Bessemer, Pittsburgh	*24.46*	24.96	25.96	44.40
Malleable, Chicago*	*20.50*	21.00	23.00	43.50
Malleable, Valley	*22.50*	23.00	24.00	44.00
Gray forge, Pittsburgh	*22.96*	23.46	22.96	44.40
L. S. charcoal, Chicago	37.50	37.50	37.50	57.50
Ferromanganese, del'd	*70.00*	75.00	80.00	225.00
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	$45.00	$45.00	$45.00	$55.00
O.-h. rails, heavy, at mill	47.00	47.00	47.00	57.00
Bess. billets, Pittsburgh	37.00	37.00	37.00	60.00
O.-h. billets, Pittsburgh	37.00	37.00	37.00	60.00
O.-h. sheet bars, P'gh	39.00	39.00	39.00	75.00
Forging billets, base, P'gh	42.00	42.00	42.00	85.00
O.-h. billets, Phila	42.74	42.74	42.74	64.10
Wire rods, Pittsburgh	48.00	48.00	48.00	75.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh., lb.	2.20	2.20	2.20	2.75
Skelp, sh. steel, P'gh., lb.	2.20	2.20	2.20	3.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.25	2.25	2.25	4.25
Iron bars, Chicago	*2.20*	2.25	2.38	3.75
Steel bars, Pittsburgh	*2.00*	2.10	2.10	3.50
Steel bars, New York	*2.38*	2.48	2.48	4.02
Tank plates, Pittsburgh	*1.90*	2.00	2.20	3.50
Tank plates, New York	*2.28*	2.38	2.58	3.77
Beams, etc., Pittsburgh	*2.00*	2.20	2.20	3.10
Beams, etc., New York	*2.38*	2.58	2.58	3.27
Steel hoops, Pittsburgh	*2.50*	2.75	2.75	5.00

Sheets, Nails and Wire,	June 21, 1921	June 14, 1921	May 24, 1921	June 22, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	*3.75*	3.85	4.00	5.50
Sheets, galv., No. 28, P'gh.	*4.75*	5.00	5.00	7.00
Sheets, blue an'l'd, 9 & 10	*2.85*	2.90	3.10	4.50
Wire nails, Pittsburgh	3.00	3.00	3.00	4.00
Plain wire, P'gh	2.75	2.75	3.00	3.50
Barbed wire, galv., P'gh	3.85	3.85	4.10	4.45
Tin plate, 100-lb. box, P'gh.	$6.25	$6.25	$6.25	$7.00
Old Material, Per Gross Ton:				
Carwheels, Chicago	$13.25	$13.25	$15.00	$35.50
Carwheels, Philadelphia	18.00	18.00	18.00	38.00
Heavy steel scrap, P'gh	*12.75*	13.00	13.50	25.00
Heavy steel scrap, Phila	*11.00*	11.50	12.00	23.00
Heavy steel scrap, Ch'go	*10.50*	11.00	11.50	23.00
No. 1 cast, Pittsburgh	*16.50*	17.00	18.00	32.00
No. 1 cast, Philadelphia	17.50	17.50	18.00	37.00
No. 1 cast, Ch'go (net ton)	*12.50*	13.00	13.50	35.50
No. 1 RR. wrot, Phila	*14.00*	15.00	15.00	33.00
No. 1 RR. wrot, Chi'go (net)	9.50	9.50	10.50	25.00
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$2.75	$3.00	$3.25	$17.00
Furnace coke, future	3.25	3.25	3.40	11.50
Foundry coke, prompt	4.50	4.50	4.50	17.00
Foundry coke, future	*4.75*	5.00	5.00	16.00
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	*12.75*	13.00	13.25	19.00
Electrolytic copper, N. Y.	*12.75*	13.00	13.25	19.00
Zinc, St. Louis	4.45	4.45	4.75	7.45
Zinc, New York	4.95	4.95	5.25	7.80
Lead, St. Louis	*4.20*	4.25	4.80	7.90
Lead, New York	*4.40*	4.50	5.10	8.15
Tin, New York	*28.75*	29.25	32.25	50.00
Antimony (Asiatic), N. Y.	*5 12½*	5.20	5.25	7.75

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

foundry is all of $1 lower. The Allegheny Steel Co. has an inquiry out for 500 tons of basic, and one leading Valley furnace interest quoted on the basis of $20.50 at furnace, but did not get the order. On another inquiry for 100 tons or less of standard Bessemer, $23, Valley furnace, did not get the business, which is reported to have gone to a dealer at not over $22.50 at furnace. Demand for foundry iron is mostly for carload lots, and standard grades can be bought in this way at $21.50, Valley furnace, for No. 2 foundry, with reports that $21 has been done. What effect, if any, the sale of ore noted above will have on prices of pig iron remains to be seen, but it will certainly not strengthen prices.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.96 per gross ton:

Basic	$20.50
Bessemer	22.50
Gray forge	$21.00 to 21.50
No. 2 foundry	21.50 to 22.00
No. 3 foundry	21.50 to 22.00
Malleable	22.50

Ferroalloys.—There is almost no activity, and prices on nearly all grades of ferroalloys are lower. Domestic 78 to 82 per cent ferromanganese is offered at $70, delivered, spiegeleisen is close to $25 on resale material and about $27 from furnace. No sales have been made in this market, and it looks as though prices may go still lower.

We quote 76 to 80 per cent ferromanganese at $70 to $75 delivered on domestic; English, 76 to 80 per cent, $75, c.i.f. Atlantic seaboard. We quote average 20 per cent spiegeleisen at $27 to $28 furnace quoted by makers on direct business and $25 to $26 furnace on resale tonnages; 50 per cent ferrosilicon, $70 furnace, freight allowed, for domestic and foreign material. Bessemer ferrosilicon is quoted f.o b. Jackson County and New Straitsville, Ohio, furnaces, as follows: 9 per cent, $41.50; 10 per cent, $45; 11 per cent, $48.50; 12 per cent, $51.60. Silvery iron, 6 per cent, $32; 7 per cent, $33.50; 8 per cent, $35.50; 9 per cent, $37.50; 10 per cent, $40; 11 per cent, $43.30; 12 per cent, $46.60. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is $4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Buying is at a standstill. Sheet and tin mills are doing so little that they are not specifying on contracts to any extent, having enough sheet bars on hand to run them over the next two or three months. Prices are largely nominal in the absence of any new business.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at $37; 2 x 2-in. billets, $39; Bessemer and open-hearth sheet bars, $39; slabs, $38; forging billets, ordinary carbons, $42, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—A local maker states he has not had an inquiry for rods in the last three months. The small wire mills that buy rods in the open market are doing very little and have enough rods to run them for some time. The April 13 price on soft rods is $48, Pittsburgh, but it is reliably stated that this price has been shaded on several small lots from $2 to $3 per ton. Prices are given on page 1722.

Plates.—The market is almost stagnant, only a few carload orders being placed, and even these are rare. Some local plate mills are shut down and others are running to only 20 to 25 per cent. It is said that on some small lots of tank plates, ¼-in. and heavier, close to 2c. at mill has been done. We quote ¼-in. and heavier sheared tank plates at 2c. to 2.10c. at mill, Pittsburgh.

Structural Material.—The American Bridge Co. reports that its estimating department is fairly busy on proposals, but that very little new business is being placed. The McClintic-Marshall Co. has taken 250 tons for the Center Avenue bridge in this city. The material for the new shops of the Crane Co. in this city, about 800 tons, on which bids went in several weeks ago, has not been closed. Local fabricating shops are operating 25 per cent or less. Prices on plain material are given on page 1722.

Iron and Steel Bars.—Local mills that roll either

iron or steel bars report that the demand is steadily diminishing, the trade feeling that prices are certain to be lower in the very near future. Orders are usually for very small lots, and a carload order for either iron or steel bars is very rare. Mills are filling the small orders mostly from stock. Reinforcing steel bars rolled from billets are held at 2.10c. base but it is intimated that 2c. could easily be done on a desirable order, and when rolled from old steel rails or other stock are quoted at about 1.75c. It is reported that the 1700 tons of reinforcing bars for the Baldwin reservoir, Cleveland, have been placed with a local mill at a low price, but this cannot be confirmed. Common iron bars are very dull in demand and prices weak.

We quote steel bars rolled from billets at 2c. to 2.10c.; reinforcing bars, rolled from billets, 2c. to 2.10c. base; reinforcing bars rolled from old rails, 1.85c. to 1.90c.; refined iron bars, 2.65c. to 2.75c., in carloads, f.o.b. mill, Pittsburgh.

Wire Products.—Very little business is being placed, the trade still waiting for lower prices on wire and wire nails, which they feel are sure to come in the near future. Stocks are being depleted as much as possible and buying is in very small lots to meet urgent needs. The wire and wire nail mills are not operating over 20 to 25 per cent of capacity.

We quote wire nails at $3 base per keg, Pittsburgh, and bright basic and Bessemer wire at $2.75 base per 100 lb. Pittsburgh.

Steel Rails.—There is no new business in standard rails, but a few small orders are being placed for light rails, mostly by the coal interests, and even the demand from this source is quieter now than for some time.

We quote 25 to 45-lb. sections, rolled from new steel, 2.20c.; rolled from old rails, 1.90c. to 2c.; standard rails, $45 mill for Bessemer, and $47 for open-hearth sections.

Nuts, Bolts and Rivets.—The demand remains very quiet, being only for small lots to cover urgent needs. Jobbers and consumers alike feel that prices will be lower before long and are cutting down their stocks as much as possible. Prices on rivets remain weak, structural and boiler rivets being quoted freely at $3 per 100 lb. and this price would be shaded on desirable orders. Prices and discounts are given on page 1722.

Spikes.—Inquiry coming in to the mills is only for small lots of a few kegs, as much as a carload being very seldom placed. Railroads are buying as few spikes as possible, one division borrowing spikes from another when it can, all this with the idea that prices will be lower. Base sizes and also large sizes of railroad spikes are now down to $3.25 flat and even this price is not strong. Local spike mills are not operating at over 25 per cent and say the outlook for betterment is not good.

Hot and Cold-Rolled Strip Steel.—Makers report that the demand for hot and cold-rolled strips is very light, mostly for small lots, to meet current needs. Prices are only fairly strong, as some makers are inclined to shade the market to get orders. We now quote 2.50c. to 2.75c. for hot-rolled and 5.25c. to 5.50c. for cold-rolled strips, f.o.b. mill, Pittsburgh.

Cold-Finished Steel Bars.—There has been some buying of cold-finished steel bars by one or two leading automobile builders for delivery this month and early July, but the general demand from the automobile trade is light and mostly for small lots for prompt shipment. Consumers feel that prices will be lower before long and are limiting their purchases to the lowest possible quantities. The mills are not running at more than 25 per cent of capacity. Prices are not strong and we quote 3c. at mill.

Steel Skelp.—Owing to the very dull conditions in iron and steel pipe, very little is being done in skelp; in fact, there has not been a sale reported in this market for some time. Mills that buy skelp in the open market have all they need. We quote steel skelp at 2.20c., f.o.b. mill, Pittsburgh, but if any desirable business were going, this price would be shaded.

Iron and Steel Pipe.—Some large gas and oil interests are said to be figuring on fair sized lines for estimating purposes only, saying they are not prepared to buy and will not, as they believe prices may be lower. The oil business has been pretty well shot to pieces and many oil operations have been stopped, these small producers not being able to meet the low prices ruling for crude oil. Prices on butt and lap-weld iron and steel pipe as fixed on April 14, are being freely shaded. Prices on line pipe are also being cut but only very small orders are being placed. The trade is inclined to reduce stocks of pipe as much as possible in the belief that prices will be lower. None of the pipe mills is operating to more than 25 per cent of capacity. Discounts are given on page 1722.

Sheets.—Reports of shading of prices on sheets seem to be well founded, as one leading producer is understood to have given its sales managers permission to meet 2.85c. on blue annealed, about 3.75c. on black and 4.75c. on galvanized. Whether other mills will take similar action is not known at this time. The amount of business being placed with sheet mills is probably less. In a general way, the market on blue annealed is 2.85c. to 3c.; No. 28 black, 3.75c. to 4c., and on No. 28 galvanized, 4.75c. to 5.25c.

Tin Plate.—The demand is very light and important users of tin plate are steadily holding up shipping directions, as they are doing very little in the making of cans and other containers. The Jones & Laughlin Steel Co. is operating only eight out of 32 mills. The American Sheet & Tin Plate Co. is running on about a 25 per cent basis, and most independent mills at a less rate. The American Sheet & Tin Plate Co. continues to quote $6.25 per base box, the April 13 price, but some mills have shaded this price. Stock items are being sold at prices ranging from $5.50 to $5.75 per base box.

Hoops and Bands.—There is only an occasional small order coming out, on which cut prices are named. We quote steel hoops and bands at 2.50c. to 2.75c., the latter being the Carnegie Steel Co. price. It is claimed that 2.50c. has been shaded recently on some small orders.

Coal and Coke.—Conditions in the coal and coke trades are, if anything, worse. The Hillman Coal & Coke Co., one of the largest operators in the region, has not a single coke plant in operation. There is almost no demand for furnace coke, and a further shutdown of ovens seems certain. Operations now in the two Connellsville regions are on about a 10 per cent basis, which will give some idea of the deplorable condition existing in the coke trade. No inquiries are in the market for furnace coke on contracts, and it is likely two or three blast furnaces now in operation will go down by July 1, and will shut off shipments. Prices on high-grade furnace and foundry coke have gone off at least 25c. per ton in the past week. We now quote high-grade furnace coke at $2.75 to $3, and high quality 72-hr. foundry at $4.75 to $5. What is known as heating coke is selling at $2 to $2.25, per net ton at oven. Mine run steam coal is held at about $1.75 to $2, high-grade gas coal, run of mine, $2.50 to $2.75 while for screening about 25c. per ton higher is charged. Leading coal and coke operators feel that the situation is so serious that they will have to do something and steps are under way looking to a complete shutdown of at least one-half of the coke ovens that are now in blast. The Connellsville *Courier* reports that for the week ending June 11, the total output of coke in the upper and lower Connellsville regions was only 32,990 tons, a loss from the previous week of over 3000 tons. In these two regions, there is a total of 35,580 ovens, and of these only 3314 were in operation last week, or about 8 per cent of the total.

Old Material.—Local dealers in scrap report that conditions are worse in the past week, consumers absolutely refusing to listen to offers of scrap even at very low prices, saying that they do not need it and will not buy until general conditions get better. Most consumers of scrap in the Pittsburgh and Valley districts are not operating at more than 20 to 25 per cent of capacity and say that they have enough scrap on hand to run them at this rate for two or three months.

Prices on nearly all grades of scrap have gone off from 25c. to 50c. per ton in the past week, and there is not enough material selling to consumers on which to determine an actual price. Dealers try to get offers from consumers but are turned down, saying that prices at which actual business might be done are very hard to determine. Max Solomon, the local dealer who bought 22,500 tons of shell forgings at Washington, recently, states that he has sold about one-half of this material at prices ranging from $17.50 to $18.50 per gross ton delivered, but these prices carry heavy rates of freight, so that actual prices netted to sellers cannot be given. He states that unless he sells the rest of his material shortly, he will bring it to Pittsburgh and store it in his yards here. Several local scrap dealers believe that prices are scraping bottom and they are inclined to buy scrap at the low prices while they can and store it in yards until there is a higher market. The difference in price between heavy melting steel and basic iron is $8 per ton or more and dealers figure that basic iron will have to come down more when the steel trade gets better or else heavy steel will go up. As stated last week, prices are largely nominal, there being no actual sales on which to base the market.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh	$12.75 to $13.00
No. 1 cast cupola size	16.50
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Parkersburg and Huntington, W. Va.; Franklin, Pa., and Pittsburgh	13.50 to 14.00
Compressed sheet steel	10.00 to 10.50
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh dist.	8.00 to 8.25
Railroad knuckles and couplers	12.50 to 13.00
Railroad coil and leaf springs	13.50 to 14.00
Railroad grate bars	11.00 to 11.25
Low phosphorus melting stock, bloom and billet ends, heavy plates, ¼-in. and thicker	16.50 to 17.00
Railroad malleable	12.00 to 13.00
Iron car axles	20.00 to 21.00
Locomotive axles, steel	17.50 to 18.00
Steel car axles	14.50 to 15.00
Cast iron wheels	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
Machine shop turnings	7.50 to 7.75
Sheet bar crop ends at origin	12.75 to 13.00
Heavy steel axle turnings	9.00 to 9.50
Short shoveling turnings	8.50 to 9.00
Heavy breakable cast	14.00 to 14.50
Stove plate	12.00 to 12.50
Cast iron borings	8.25 to 8.50
No. 1 railroad wrought	12.00 to 12.50

FAR EASTERN BUYING

Japan Inquires for Structural Steel, Light Rails, Tubes, Etc.—China Orders Rolling Stock

NEW YORK, June 21.—Inquiries from foreign buyers continue more active than for some time past and a few orders are being placed. South American inquiries are again appearing in the export market, although for the most part they are small. One exporter is bidding on about 200 tons of No. 24 gage galvanized sheets for Argentina, and the order for a small tonnage of corrugated tank sheets for the same market has not yet been placed. The contract for about 420 tons of hollow, round drill steel for Durban, South Africa, which was recently in the hands of a New York exporter, has been placed in England, divided between Vickers, Ltd., London, and another large British manufacturer, for about £65 per ton (10.95c. per lb.) c.i.f. Durban. The American bid submitted, which was based on the quotation of a large producer, while below the present domestic market, was above the British price. The American quotation would have been reduced to obtain the business, but the buyer placed the order in England without seeking to obtain lower American prices. European material, at present exchange rates, is still a profitable import, provided buyers can be found. Belgian wire rods can now be put down at Atlantic coast ports for about $45 per ton, and billets, sheet bars and slabs from $33 to $35 per ton.

Numerous Japanese Inquiries

There are inquiries in the market from Japanese buyers for locomotive boiler tubes, superheaters, small tonnages of light rail and fish plates for the South Manchurian Railroad and about 5000 boxes of tin plate for the Japanese army. With the mining industry in Japan at its present low ebb, any large buying of light rails at present is doubtful. The inquiry recently in the market for about 3000 tons of 50-in. cast-iron water pipe for waterworks in the vicinity of Tokio went to a Japanese maker at a low price, owing to the cheapness of Chinese pig iron.

An exporter to the Far East is submitting quotations on structural material, about 400 tons, for Japan. About 300 tons of this will probably be placed in Europe and 100 tons in the United States. The specifications call for a French type of beam, a British tee and American type of channels. Because of difficulty in making shipments from England at present, the order for the tees may go to an American producer. Another exporter is handling an inquiry from Japan for about 200 tons of black sheets, which will probably be placed with a German mill. Among the canceled tonnages being offered by banks is about 250 tons of 12-lb. rails at Philadelphia and 105 tons of 12-lb. rails at a point in New Jersey, offered by a Japanese branch bank. The demurrage on the former lot is said to amount to several thousand dollars.

More Chinese Rolling Stock Inquiries

The order of the Pekin-Suiyan Railroad in China, in the hands of the Universal Steel Export Co., 26 Cortlandt Street, New York, calls for a total of 37 locomotives, of which 25 are of the Mikado type, 5 of the Pacific type and 7 articulated Mallet type. The total of cars on this order is 400 high side steel cars of 40 tons capacity. The exporter has arranged to accept 8 per cent gold bonds of the Chinese Government, through the Bank of Communications, China. It is worthy of note that the Pekin-Suiyan Railroad and the Pekin-Hankow Railroad are both government owned and that the Pekin-Kalgan, part of the Pekin-Suiyan Railroad, was the recent purchaser of 42 locomotives from the American Locomotive Co., through Mitsui & Co., financed over a period of four years. The Pekin-Hankow Railroad is in the market for 30 Prairie type locomotives, 2 Pacific and 3 Mikado type, on which bids close June 29, and the Pekin-Suiyan is still in the market for 30 Prairie type locomotives, bids on which will close the same date. One exporter in close touch with the present Chinese buying of rolling stock suggests that these railroads may be overreaching themselves and be forced for financial reasons to retrench.

Bids were recently submitted by one exporter to a Shanghai company on about 17 miles of 30-lb. rails, 30 light gage flat cars and 3 Davenport type locomotives, evidently for logging or mining work in China. A $1,000,000 inquiry has been issued for coin making machinery for the Chinese Government mint at Shanghai. A New York exporter has received an order from the South Manchurian Railroad for 450 steel poles, but as the manufacturer who bid on this lot has granted an agency in this district of Manchuria to another company, filling of the order is being delayed. The 200 tons of steel tank plates inquired for from China was placed with an American mill at a price based on about 1.80c. per lb., Pittsburgh.

The Fairmount Foundry & Engineering Works, Woonsocket, R. I., has increased its foundry output to five heats per week. Its new machine shop is in operation, and the pattern shop, located below, is practically completed. Other plant improvements held up because of a strike of molders will be concluded as soon as business conditions warrant. These include a new core room and ovens, one of the latter capable of handling large work. The pouring floor capacity, which was practically doubled last year, is to be further increased. The plant is now operated as an open shop. C. Belisle is superintendent of foundry and Clifford H. Teachman is in charge of the machine shop.

Chicago

CHICAGO, June 21.

Most mills, the Steel Corporation subsidiaries included, are no longer adhering to the stabilized prices of April. The ruling market on plates, shapes and bars appears to be about 2c., Pittsburgh, with the latter product the weakest of the three. Sheets have dropped about $5 a ton and bolt and nut discounts have been revised downward. Pig iron has also weakened and is now freely quoted at 50c. a ton less than a week ago. Cast iron pipe is unsteady and track spikes and bolts have declined to 3.25c. and 4.20c., Pittsburgh, respectively.

The most important inquiry for steel is 7000 tons of plates for 50 oil storage tanks to be built for the Sinclair Consolidated Oil Co. The railroads are letting more orders for car repairs and it is asserted that repair work will be undertaken in earnest after July 1, when the wage reductions go into effect. The St. Paul has purchased 700 tons of malleable and 100 tons of foundry for its own foundries.

Operations in this district are still at a very low rate, although there had been slight improvement in some directions. The bar iron mills of the Republic Iron & Steel Co. and the Interstate Iron & Steel Co. at East Chicago have resumed operations and the Chicago Heights bar mill of the Inland Steel Co. was started this week. The Wisconsin Steel Works also put on one of its mills Monday and expects to add another mill next week. The operations of the Illinois Steel Co. are slightly less than a week ago. Nine out of its 29 blast furnaces in this district remain active, while steel output has dropped to 28 per cent of ingot capacity. The operations of the Inland mills at Indiana Harbor are intermittent but average about 25 per cent. This company still has two out of three furnaces in blast. At South Chicago the Interstate Iron & Steel Co. is maintaining a 30 per cent operation.

Pig Iron.—Recent sales indicate another drop in the market of about 50c. a ton. Two 500-ton lots of Northern foundry were sold in Chicago and vicinity at $20.50 base, furnace, and a few carload lots have been moved at the same price. The St. Paul Railroad purchased 700 tons of malleable and 100 tons of No. 1 foundry and is reported to have paid $20.50, base, furnace. A Wisconsin sanitary goods manufacturer has bought 1000 tons of foundry. Two 300-ton lots of Southern resale foundry have been sold in Wisconsin at delivered prices which compare favorably with those of Northern producers. Practically all of the Southern resale recently offered on the market has now been disposed of, however. Eight or 10 carloads of resale silvery have been sold of late at from $3 to $4 below the lowest furnace quotation, and there are still about 300 tons on the market. Among current inquiries is one for 150 tons of 13 to 15 per cent silvery. Although prices have declined without interruption since last fall, there are those who believe that a reaction may occur in the near future. Only two blast furnaces in this district are on merchant iron, one of them being a steel works stack. The blowing out of either would tend to stiffen the market, as stocks on furnace yards are not large. Two more local jobbing foundries have adopted the union shop. There are now four which have done so, Holmes, Pyott & Co., the R. M. Eddy Foundry Co., the Greenlee Foundry Co. and the James A. Brady Foundry Co.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	$37.50
Northern coke, No. 1, sil. 2.25 to 2.75	$21.00 to 21.50
Northern coke foundry, No. 2, sil. 1.75 to 2.25	20.50 to 21.00
Northern high phos	20.50 to 21.00
Southern foundry, sil. 1.75 to 2.25	27.67
Malleable, not over 2.25 sil	20.50 to 21.00
Basic	20.50 to 21.00
Low phos., f.o.b. Birmingham, sil. 1 to 2 per cent copper free	31 00
Silvery, sil. 8 per cent	38.53

Plates.—The Sinclair Consolidated Oil Co. is asking for bids on the fabrication of 50 storage tanks of 55,000 bbls. capacity each for erection in the midcontinental fields. This job involves 7000 tons of plates and is the only large query in the market. Practically all mills have discontinued quoting 2.20c., Pittsburgh, on tank plates, and are meeting competition. The ruling market appears to be about 2c., Pittsburgh, although even lower prices are occasionally reported.

The mill quotation is 2c. Pittsburgh, the freight to Chicago being 38c. per 100 lb. Jobbers quote 3.23c. for plates out of stock.

Ferroalloys.—One carload of ferromanganese, 78 to 82 per cent, has been bought at $78 delivered Granite City. Aside from this sale the market is without features.

We quote 78 to 82 per cent ferromanganese, $78 delivered; 50 per cent ferrosilicon, $80 delivered; spiegeleisen, 18 to 22 per cent, $37 to $38 delivered.

Structural Material.—An open market exists on plain material, with ruling quotations at 2c., Pittsburgh. Bookings remain light. There is little change in the situation so far as fabricators are concerned. The resumption of building in Chicago has permitted old projects to go ahead, but it is unlikely that new work will be undertaken until Judge Landis, umpire in the dispute between contractors and unions, renders a decision on wages and working conditions. Bids on the Masonic Temple building in Detroit involving 7000 tons, were not opened on June 11, consideration of the figures having been postponed until late this month. Fabricators continue to take business at very low prices. On 116 tons for a building in Elkhart, Ind., the successful bid, covering the erection, was only $266 more than the delivered price quoted by a competing fabricator. A bridge in Montana involving 408 tons was taken at $95 a ton delivered. Fabrication awards include:

Central unit high school, Boise, Idaho, 106 tons, to Minneapolis Steel & Machinery Co.

Colburn warehouse, Indianapolis, 250 tons, to Central States Bridge Co.

American Coating Mills, Inc., Elkhart, Ind., 116 tons, to Elkhart Bridge & Iron Works.

Bridge, Eagle Butte, Ziebeck County, South Dakota, 408 tons, sublet to Joseph T. Ryerson & Sons.

Board of Commissioners, Port of New Orleans, marine leg unloader, 233 tons, Pensacola Shipbuilding Co., Pensacola, Fla., low bidder.

Current inquiries include:

Lake Worth Bridge, West Palm Beach, Fla., 170 tons, bids opened last week.

Chicago & Northwestern Railroad, water tank supports, tonnage not given.

Lake Shore Trust & Savings Bank, Chicago, 325 tons, bids on general contract being taken this week.

Federal Reserve Bank, Minneapolis, 600 tons, Cass Gilbert, New York, architect.

The mill quotation is 2c., Pittsburgh, which takes a freight rate of 38c. per 100 lb. for Chicago delivery. Jobbers quote 3.23c. for materials out of warehouse.

Rails and Track Supplies.—Track spikes and bolts are now rather generally quoted at 3.75c. and 4.20c., Pittsburgh, respectively. Tie plate and angle bar prices remain unchanged. The railroads continue to send in releases against contracts, not a great deal in tonnage but numerous enough to show that they are in urgent need of the material. Liberal orders are looked for after July 1. The Chicago surface lines have bought 600,000 screw spikes and clips from an Eastern mill.

Standard Bessemer rails, $45; open-hearth rails, $47; light rails rolled from new steel, 2.20c. f.o.b. makers' mills.

Standard railroad spikes, 3.25c., Pittsburgh; track bolts with square nuts, 4.20c., Pittsburgh; steel tie plates, 2.50c., and steel angle bars, 2.75c., Pittsburgh and Chicago; tie plates, iron, 2.50c. to 3c. f.o.b. makers' mills.

Bolts and Nuts.—The discounts which were adopted by most makers early in April and which were later withdrawn when the market on steel bars advanced, are now being generally quoted, although one or two manufacturers are naming even lower prices. The new discounts were originally named on the assumption that bars would be reduced to 1.75c., Pittsburgh, and their readoption indicates that bars are expected to drop to that level soon or that operating costs have been materially reduced. There is little business in the market. Ford Motor Co., which was expected to buy its next month's requirements during the current week, will probably not take action until next week. This

company expects to turn out 100,000 automobiles this month and about 80,000 in July.

Jobbers quote structural rivets, 4.53c.; boiler rivets, 4.63c.; machine bolts up to ⅞ x 4 in., 60 per cent off; larger sizes, 50 and 5 off; carriage bolts up to ⅞ x 6 in., 50 off; larger sizes, 50 off; hot pressed nuts, square and hexagon tapped, $2.10 off; blank nuts, $2.60 off; coach or lag screws, gimlet points, square heads, 55 and 5 per cent off. Quantity extras are unchanged.

Bars.—Mild steel bars generally are quoted at 2c., Pittsburgh and 1.90c., Pittsburgh, is not uncommon. Occasionally even less is quoted; for example, 200 tons for local delivery was placed at 1.85c., Pittsburgh. Demand remains light, although some car repair work is developing and some reinforcing work is being let. The Erie Railroad has let repairs on 1000 box cars to the Standard Steel Car Co. and on 400 box cars to the Illinois Car & Equipment Co. This road is also asking for figures on 1000 box and 1000 hopper cars. The Chicago & Illinois Midland took figures last week on the repair of 725 composite gondola cars, but has not yet placed the order. Among reinforcing projects the largest is a sewage disposal plant at Milwaukee involving 6000 tons to be let in sections. A continuation school at Milwaukee calls for 600 tons, an apartment building in the same city 200 tons and a hospital at Appleton, Wis., 200 tons. Recent awards include 400 tons for the Mail Terminal building at the Chicago Union station and 100 tons for subway work at the Union station to the Paul J. Kalman Co., and 200 tons for a Chicago apartment building to the Calumet Steel Co. The last named tonnage was rail-carbon steel bars. Warehouse prices on reinforcing bars are uncertain. In some cases, mill prices are quoted and in other cases engineering work, trucking, etc., have been thrown in as inducements to the purchaser. The sharp competition in the reinforcing business is due not so much to a lack of business as to active competition by the mills. Bar business from other sources is so light that the mills are competing with reinforcing companies for business, furnishing the engineering service themselves. Demand for bar iron continues light, although an accummulation of orders has enabled the two East Chicago plants to resume operation. The principal hope for business lies in car repairs which are expected to be undertaken on a large scale by the railroads after July 1. One of the rail-carbon steel bar mills at Chicago Heights resumed operation yesterday, but demand for hard steel bars is scanty. Both bar iron and hard steel are weaker, the ruling market on the former being 2.20c. to 2.28c., Chicago, and on the latter 1.90c. to 2c., Chicago.

Mill prices are: Mild steel bars, 1.90c. to 2c., Pittsburgh, taking a freight of 38c. per 100 lb.; common bar iron, 2.20c. to 2.28c. Chicago; rail carbon, 1.90c. to 2c., mill or Chicago.

Jobbers quote 3.13c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars is 4.63c. for rounds and 50c. extra for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.48c. base.

Cast Iron Pipe.—The market is weak, prices ranging from $40 to $45, base, Birmingham. In point of tonnage, inquiry is heavier, the city of Detroit being in the market for over 16,000 tons. Recent awards include:

Marion, Ill., 700 tons, to United States Cast Iron Pipe & Foundry Co.

Erie, Ill., 250 tons, to Lynchburg Foundry Co.

Brookfield, Mo., 750 tons, National Cast Iron Pipe Co. low bidder.

Detroit, 250 tons, to National Cast Iron Pipe Co.

Inquiries include:

Board of Water Commissioners, Detroit, 8400 tons of 24-in., 725 tons of 30-in. and 6900 tons of 36-in., bids to be taken June 24.

Board of Fire Commissioners, Detroit, 100 tons of 20-in. high pressure pipe, June 23.

Akron, Ohio, 6500 tons 48-in., bids opened for second time June 20, original bids having been rejected.

Springfield, Ill., 80 tons of 6-in., June 20.

Moweaqua, Ill., 50 tons, June 20.

Forest Lake, Minn., 450 tons, bids to be taken some time in July.

We quote per net ton f.o.b. Chicago, ex-war tax as follows: Water pipe, 4-in., $57.10; 6-in. and above, $54.10; class A and gas pipe, $3 extra.

Sheets.—Most makers have reduced prices to 2.85c., Pittsburgh, for No. 10 blue annealed; 3.75c., Pittsburgh, for No. 28 black, and 4.75c., Pittsburgh, for No. 28 galvanized. Reductions on black and galvanized are more general than on blue annealed for which a number of mills are still asking 3.10c., Pittsburgh. Buying is light but nevertheless bookings are probably as large or larger than in plates, shapes or bars. One local maker is operating its sheet mills at 50 per cent of capacity. A few hundred tons for export to South America and the Far East continues to be booked every week. Local warehouse prices on black, galvanized, flue annealed, and lead-coated sheets have been reduced $5 a ton.

Mill quotations are 3.75c. for No. 28 black; 2.85c. to 3.10c for No. 10 blue annealed and 4.75c. for No. 28 galvanized, these all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.88c.; No. 28 black, 5.15c.; No. 28 galvanized, 6.15c.

Wire Products.—Jobbers in the West, and to some extent in the South, continue to buy for quick turnover, but are not laying in stocks. Nails are bought most freely and hay bale ties are moving. The season for barbed wire is about over. For mill prices, see finished iron and steel f.o.b. Pittsburgh, page 1722.

We quote warehouse prices, f.o.b. Chicago: No. 9 and heavier black annealed wire $3.63 per 100 lb.; No. 9 and heavier bright basic wire, $3.78 per 100 lb.; common wire nails, $3.73 per 100 lb.; cement coated nails, $3.15 per keg.

Railroad Rolling Stock.—The Pittsburgh & West Virginia is inquiring for two Pacific type locomotives. A number of car repair orders and inquiries are mentioned in the bar paragraph.

Old Material.—The trend of the market is still downward, most grades of scrap having declined 50c. a ton or more. Consumers continue to buy sparingly, but their purchases confirm the quotations named below. Among recent transactions may be mentioned the purchase of 1000 tons of heavy melting at $11 per gross ton, 100 tons of No. 1 wrought at $9.50 per net ton and 150 tons of No. 1 busheling at $8.75 per net ton. There is only one railroad offering, the Burlington advertising 4800 tons.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$16.00 to $16.50
Relaying rails	30.00 to 32.00
Car wheels	13.25 to 13.75
Steel rails, rerolling	12.75 to 13.00
Steel rails, less than 3 ft.	11.75 to 12.00
Heavy melting steel	10.50 to 11.00
Frogs, switches and guards, cut apart	10.50 to 11.00
Shoveling steel	10.00 to 10.50
Low phos. heavy melting steel	13.75 to 14.25
Drop forge flashings	6.50 to 7.00
Hydraulic compressed sheet	6.50 to 7.00
Axle turnings	7.00 to 7.50
Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.00 to 10.50
Iron arch bars and transoms	14.00 to 14.50
Iron car axles	18.50 to 19.00
Steel car axles	12.50 to 13.00
No. 1 busheling	8.50 to 9.00
No. 2 busheling	6.00 to 6.50
Cut forge	9.50 to 10.00
Pipes and flues	6.00 to 6.50
No. 1 railroad wrought	9.50 to 9.75
No. 2 railroad wrought	9.25 to 9.75
Steel knuckles and couplers	11.50 to 12.00
Coil springs	12.00 to 12.50
No. 1 machinery cast	12.50 to 13.00
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	9.75 to 10.25
Machine shop turnings	3.50 to 4.00
Cast borings	5.00 to 5.50
Stove plate	12.00 to 12.50
Grate bars	10.00 to 10.50
Brake shoes	10.25 to 10.75
Railroad malleable	11.25 to 11.75
Agricultural malleable	11.25 to 11.75
Country mixed	7.00 to 7.50

The monthly meeting of the Engineers' Society of Western Pennsylvania was held in the William Penn Hotel, Pittsburgh, Tuesday evening, June 14. Edwin S. Wheeler, assistant manager technical department, International Nickel Co., and Robert J. McKay, industrial fellow, Mellon Institute, Pittsburgh, jointly presented a paper on "Some Technical Uses and Properties of Monel Metal." A. B. Farr, mechanical engineer, Calorizing Co., Pittsburgh, also presented a paper on "Calorizing as a Protection for Metals."

Boston

Boston, June 21.

Pig Iron.—A circular addressed to the New England trade offering a nameless iron in 1000-ton lots, with a Buffalo freight rate, at $21.75 for either silicon 1.75 to 2.25 or silicon 2.75 to 3.25, August and September delivery, followed by an inquiry for 5000 tons silicon 1.75 to 2.25 from the H. B. Smith Co., Westfield, Mass., which will be closed this week, brought out new low prices for this movement on Buffalo and eastern Pennsylvania irons. The circular offer was met by one of $21.50 for silicon 1.75 to 2.25 with 50c. differentials by a northern furnace. Buffalo iron is reported as offered the Smith company at $20 shipping point which, with a $5.46 freight, brings the delivered price up to $25.46. This quotation was met by eastern Pennsylvania furnace interests with a freight of $4.06, at a landed cost of $25.06 or $21 furnace. A Providence melter purchased 1000 tons, 500 tons regular Buffalo furnace silicon 3.25 to 3.75 and 500 tons resale northern No. 2 X, the latter, it is reported, from another Providence foundry, at private terms. The indicated price on the furnace iron is less than $22, base. A Massachusetts firm took 600 tons eastern Pennsylvania, silicon 2.25 to 2.75, at $22 furnace base, delivery 200 tons per month, which, with the Smith company business and numerous car lots sold, brings the total week's bookings up to between 7000 and 8000 tons. Pennsylvania car-lot sale prices are out of proportion with those quoted on round tonnages. For instance, a Massachusetts consumer bought a car No. 1 X at $31.31 delivered or close to $26, furnace base, and other sales closed at $25, $24.50, $24 and $23.50. More inquiries are noted than has been the case before in months but most of them involve small tonnages. A Vermont scale maker has withdrawn inquiry on 300 tons foundry and a car of charcoal iron. Prices quoted on Buffalo and Pennsylvania have eliminated Virginia and Alabama irons in this market. The Sloss-Sheffield price of $22.50 is bettered by 50c. by other Alabama furnace interests. Unless there is more equalization of manufacturing costs and selling profits, some Buffalo interests, at least, signify they will not blow in furnaces this year. Delivered pig iron prices follow:

East. Penn., silicon 2.25 to 2.75	$25.56 to $28.56
East. Penn., silicon 1.75 to 2.25	25.06 to 28.06
Buffalo, silicon 2.25 to 2.75	25.96 to 29.46
Buffalo, silicon 1.75 to 2.25	25.46 to 28.46
Virginia, silicon 2.25 to 2.75	33.58 to 34.58
Virginia, silicon 1.75 to 2.25	32.58 to 33.58
Alabama, silicon 2.25 to 2.75	33.16 to 33.66
Alabama, silicon 1.75 to 2.25	32.66 to 33.16

Warehouse Business.—Jobbers continue to report a slow but steady increase in sales of iron and steel but many individual orders are necessary to make up a ton of material. The Edgar T. Ward's Sons Co. has reduced prices on shafting to $3.35 base in car lots and to $3.60 base in less than car lots f.o.b. Cumberland, Md., while the Union Drawn Steel Co., Beaver Falls, Pa., has cut prices on cold drawn steel, shafting, etc., 10c. per cwt. to $3 base, with the regular extras.

Jobbers now quote: Soft steel bars, $3.18 per 100 lb. base; flats, $4.18 to $4.28; concrete bars, $3.18 to $3.45¼; tire steel, $4.25 to $4.75; spring steel, open hearth, $5.50; crucible, $11.50; steel bands, $3.83 to $4.48; steel hoops, $4.38; toe calk steel, $5.25; cold rolled steel, $4.65 to $5.15; structural, $3.18 to $3.28; plates, $3.28 to $3.50; No. 10 blue annealed sheets, $4.53; No. 28 black sheets, $5.85; No. 28 galvanized sheets, $6.85; refined iron, $3.18 to $5; best refined, $5; Wayne iron, $8.50; Norway iron, round, ¼-in. to 2½-in., 8c. per lb. net; other sizes, 10c. base.

Coke.—Many last half foundry coke contracts, ranging from 200 to 600 tons, were booked by New England ovens the past week on the basis reported June 14. Important New England consumers have not signed up, however, nor do they indicate they will within the near future. Average daily shipments on current foundry needs are slightly below those for the corresponding period last month. Indicated wants this week, however, should serve to hold the average. Scattered car-lot sales of Connellsville coke at $4.50 and $4.75 f.o.b. ovens, are reported.

Old Material.—The market for machinery cast appears softer, although not quotably lower. A nearby foundry this week bought 100 tons No. 1 at $18, delivered, the high price of the week. The other extreme is $16, delivered, in greater Boston. Where freight is involved, the delivered price ranges from $17 to $17.50, several sales of 50 and 100-ton lots to Massachusetts and New Hampshire melters on that basis being reported. Stove plate is sentimentally easier due to the withdrawal of a Norwood, Mass., buyer from the market. Chemical interests and Pennsylvania rolling mills have taken round tonnages of cast iron borings at $4.50 f.o.b. shipping point. Pennsylvania mills have dropped bids on heavy melting steel about 50c. a ton. The old material market otherwise is quiet and without special feature.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$17.00 to $17.50
No. 2 machinery cast	15.00 to 16.50
Stove plate	15.00 to 16.00
Railroad malleable	14.00 to 15.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$6.00 to $6.50
No. 1 railroad wrought	10.00 to 10.50
No. 1 yard wrought	8.50 to 9.00
Wrought pipe (1-in. in diameter, over 2 ft. long)	7.00 to 7.50
Machine shop turnings	3.00
Cast iron borings, rolling mill	3.00
Cast iron borings, chemical	3.00 to 3.50
Blast furnace borings and turnings	3.00
Forged scrap and bundled skeleton	5.00 to 5.50
Street car axles and shafting	12.00 to 12.50
Car wheels	11.50 to 12.00
Rerolling rails	9.00 to 10.00

Buffalo

BUFFALO, June 21.

Pig Iron.—Keen competition in Buffalo iron has developed with the effort of a mill interest to sell its pig iron ordinarily used in its steel activity. This iron has been freely quoted to Eastern buyers and, although the price is slightly under the schedule maintained by Buffalo interests, no startling orders have been booked. One inquiry for 5000 tons from New England is mentioned. The trend of business with the other Buffalo sellers is about the same. One maker has a total inquiry for the week of 7000 tons, much of it being for delivery for the latter part of the year but, conforming to the policy which has prevailed for some time quotations are refused. A seller who has not quoted below $24, base, and in consequence has been practically isolated, has sold a few carloads at the above named figure. A few inquiries for carload lots of malleable have been engaging one producer. Better shipping has been done by one maker with sales of approximately 2000 tons, $23, base, being the low level. A slight increase is noted in inquiries from points where Buffalo is able to compete by reason of freight rates.

We quote f.o.b. dealers' asking prices per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil	$25.00 to $26.00
No. 2X foundry, 2.25 to 2.75 sil	24.00 to 25.00
No. 2 plain, 1.75 to 2.25 sil	23.00 to 24.00
Basic (nominal)	21.00 to 22.00
Malleable (nominal)	23.00 to 24.00
Lake Superior charcoal	37.00

Finished Iron and Steel.—Price shading in several commodities is reported regularly but no orders of importance have developed. Belief that new price schedules will be announced July 1 continues to keep the market unsettled. Better business from the railroads is expected with the receipt of an inquiry involving 7000 tons of plates, shapes and bars, from the Chesapeake & Ohio Railroad. The mill, which is figuring on this business, also has an inquiry for 5000 tons of plates, shapes and bars, from a New England consumer. In the entire Buffalo market the best business is in electric welded material used in road making and poultry and fence wire used in rural communities. The failure of jobbers to anticipate this year's needs is responsible for this influx of business. A mill making a wide variety of wire nails has withdrawn except in nails used for small packages. Price cutting has caused this situation. Steel pipe is being sold in carload lots by one seller. Sheet prices have been shaded and galvanized sheets are now quoted at 4.55c. and black sheets at 3.55c. There is nothing moving in bars or shafting. Structural business is expected to improve with the conclusion of the Lockwood investigation into building conditions. Although the committee inquired deeply

into conditions among the fabricators, the agreement among building supply dealers to abandon price fixing is expected to release much work which had been deferred to await the coming of the committee. On the other hand several jobs of considerable size will probably be refigured and delay in placing this work may result. The Kellogg Structural Steel Co. will fabricate 175 tons for an addition to the Danahy Packing Co. plant, Buffalo. Several smaller jobs are reported by the same firm. Prices on steel for use in the new penitentiary at Alden, N. Y., have been rejected by the board of supervisors and new ones will be requested.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 3.25c.; plates, 3.25c.; plates, No. 8 gage, 4.10c.; soft steel bars and shapes, 3.15c.; hoops, 3.85c.; blue annealed sheets, No. 10 gage, 4.15c.; galvanized steel sheets, No. 28 gage, 6.30c.; black sheets, No. 28 gage, 5.30c.; No. 9 gage annealed wire, 4.35c.; cold rolled strip steel, 8.15c.

Old Material.—Dealers buying small quantities of heavy melting steel to complete the order of a railroad equipment maker present the only activity. Consumers are not buying except in extremely small lots, a carload lot order for cast scrap for a local foundry representing the most activity in one office. Dealers trading in heavy melting steel have forced the price to $12 but all other prices are nominal. One of the largest dealers says his business is stagnant and that no improvement is expected this year.

We quote dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$12.00 to $12.50
Hydraulic compressed	9.00 to 9.50
Low phos., 0.04 and under	17.00 to 18.00
No. 1 railroad wrought	13.00 to 14.00
Car wheels	14.50 to 15.00
Railroad malleable	10.50 to 11.50
Machine shop turnings	6.00 to 7.00
Heavy axle turnings	9.00 to 10.00
Clean cast borings	6.00 to 7.00
Locomotive grate bars	10.50 to 11.50
Wrought pipe	8.00 to 9.00
No. 1 busheling	9.50 to 10.50
Stove plate	14.00 to 15.00
Bundled sheet stampings	7.00 to 8.00
No. 1 machinery cast	17.50 to 18.00

Birmingham

BIRMINGHAM, ALA., June 21.

Pig Iron.—Birmingham makers agree that the past two weeks have marked a new low in sales and inquiry. The largest transaction heard of was 250 tons for a Middle Western consumer. This was high in manganese and low in sulphur and brought $3 above the $22 base. Lots ordered run about 25 to 50 tons with scarcely any variation on a $22.50 base and delivery is seldom other than prompt. From 100 tons up can be purchased at $22. One maker with one of the three active stacks is thinking of putting that out on account of cost of operation, the effort to keep going not being worth while. Some Southern roads are reported as regarding with favor the effort of iron interests to have a through rate to interior Eastern points declared via the Warrior River barges and Mallory line out of Mobile. If the same differentials are secured for northbound traffic as were lately secured for southbound by this route, the Boston and interior rate would be 20 per cent off of $10.26, a matter of $2 per ton. Birmingham iron has done as much as 200,000 to 250,00 tons of business per annum in the East, but it is now almost nil, as rail rates shut it out. Iron interests are also seeking water rates via Warrior and Mississippi barges to St. Louis. The friendliness of Southern roads is understood to be due to preference for short hauls to this river compared with none and to the prospect that Eastern roads would lower rates from ports to interior points if Birmingham iron again commenced appearing in the East. The following export rates to Mobile, effective July 15, have been announced by railroads: Pig iron $2.75, now is $4.13; same on steel plates; cast iron pipe, $3.13, now is $4.70; steel products, 19c per 100, now is 23.50c. New export rates are the same as rates to the Pacific Coast.

We quote per gross ton f.o.b. Birmingham district furnace, as follows:

Foundry, sil. 1.75 to 2.25	$22.00
Basic	21.00
Charcoal	35.00

Cast Iron Pipe.—The National Cast Iron Pipe Co. is operating now at 70 per cent on Middle Western orders principally. The United States Cast Iron Pipe & Foundry Co. is operating in a small way at Bessemer, Birmingham and Anniston. No new large business is reported. The price base of $45 is under-cut in instances. Soil pipe plant activity is about 30 per cent. The Iron City Pipe Co. is to resume July 1. Base remains at $40.

Finished Material.—The tie-plate plant at Fairfield is busy and the rail mill is operating at around normal. Cotton tie and band mills have shut down after two weeks of operation. There is no business based on agriculture, but demands are fair for nails. Steel pipe is actively inquired for in the Southwest and Mexico.

Old Material.—The scrap market is in such a stagnant condition that quotations fail to represent anything. They are nominal. Increased melt of foundries suggests a coming improvement.

We quote per gross ton f.o.b. Birmingham district yard as follows:

Old steel rails	$10.00 to $11.00
No. 1 steel	9.00 to 10.00
No. 1 cast	16.00 to 17.00
Car wheels	16.00 to 17.00
Tramcar wheels	15.00 to 16.00
No. 1 wrought	13.00 to 14.00
Stove plate	9.00 to 10.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Philadelphia

PHILADELPHIA, June 21.

Further cutting of steel prices has become apparent during the past week. Sheets are down fully $5 a ton from the uniform schedule adopted about two months ago; wire products have been shaded in about the same amount; soft steel bars have sold at 2c., Pittsburgh, for Eastern shipment; plates are very weak, with the probability that some low prices will be brought out by large inquiries for tanks now in the market. Structural shapes seem to have been less affected by price concessions than any rolled product.

The scrap market has shown further weakness and prices on many grades are off 50c. to $1 a ton.

Pig Iron.—So little business in pig iron is being done that prices are stationary. Eastern furnaces a few weeks ago determined to go no lower than $24 for No. 2 plain, $25 for No. 2X and $26 for No. 1X, f.o.b. furnace, and apparently have adhered to these quotations. Orders have been mainly for carload lots, on which there has been no temptation to cut. The representatives of Eastern operators whose stacks are still in blast assert they will not shade these prices, but they are letting some business slip through their hands because of lower quotations from Buffalo furnaces, this applying, of course, to districts where Buffalo furnaces have an equally advantageous freight rate.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to $1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25	$24.75 to $25.25
East. Pa. No. 2X, 2.25 to 2.75 sil.	25.50 to 26.25
Virginia No. 2 plain, 1.75 to 2.25 sil.	31.74
Virginia No. 2X, 2.25 to 2.75 sil.	32.99
Basic deliv. Eastern Pa.	25.00
Gray forge	25.26
Standard low phos. (f.o.b. furnace)	38.00
Malleable	28.00 to 29.00
Copper bearing low phos. (f.o.b. furnace)	35.00

Ferroalloys.—Ferromanganese is weak at $75 to $80 delivered, while spiegeleisen is to be had at $30, furnace, or less. There is practically no business.

Semi-Finished Steel.—It is reported that sales of wire rods have been sold at a few dollars a ton under the $47 price adopted about two months ago. There is no demand for billets, which are quoted at $37 for rerolling quality and $42 for forging quality, Pittsburgh.

Plates.—While the plate market is weak, the price situation is not well defined because of the lack of inquiry. On current small inquiries, 2c. for carload lots and 2.20c. for less than carloads are generally quoted, but on attractive specifications for large tonnage lower prices would undoubtedly be made. Two such inquiries now in the market, one for about 7500 tons of plates for 50 tanks for the Sinclair Consolidated Oil Corporation, and the other for about 3500 tons for 25 tanks for the

Standard Oil Co. at Baton Rouge, La., are said to have brought out some fairly low quotations.

Structural Material.—There is a fair prospect of work going ahead on docks and terminals at Wilmington, Del., requiring about 1200 tons. In Philadelphia all building work is still held up by strikes. Eastern steel companies believe that considerable big work will come out in July, several large projects for New York being under consideration. Shapes are quoted at 2.20c., Pittsburgh.

Bars.—A leading independent has booked an order for about 160 tons of soft steel bars at 2c., Pittsburgh. This appears to be the first definite break in the price of soft steel bars, though rail carbon bars for reinforcing work have been selling for some weeks at 1.85c. and 1.90c., Pittsburgh.

Sheets.—Prices of sheets, which have been soft for some weeks, are now more definitely fixed by several mills at $5 a ton under the quotations adopted in April. Blue annealed are obtainable at 2.85c.; black at 3.75c. and galvanized at 4.75c., Pittsburgh, though all mills are not meeting these prices.

Warehouse Business.—There is no improvement in the volume of orders booked by local warehouses. Prices remain the same as quoted last week, as follows:

Soft steel bars and small shapes, 3.20c.; iron bars (except bands), 3c.; round edge iron, 3.30c.; round edge steel, iron finish, 1½ in. x ½ in., 3.50c.; round edge steel, planished, 4.25c.; tank steel plates, ¼-in. and heavier, 3.30c.; tank steel plates, 3/16-in., 3.52c.; blue annealed steel sheets, No. 10 gage, 4.20c.; light black steel sheets, No. 28 gage, 5c.; galvanized sheets, No. 28 gage, 6c.; square twisted and deformed steel bars, 3.20c.; structural shapes, 3.30c.; diamond pattern plates, ¼-in., 5.05c.; 3/16-in., 5.27c.; ⅛-in., 5.37c.; spring steel, 5c.; round cold-rolled steel, 4.60c.; squares and hexagons cold-rolled steel, 5.10c.; steel hoops, No. 13 gage and lighter, 3.85c.; steel bands, No. 12 gage to 3/16-in. inclusive, 3.85c.; iron bands, 4.30c.; rails, 3.20c.; tool steel, 12c.; Norway iron, 8c.; toe steel, 4.50c.

Old Material.—Scrap is being offered by many dealers and there are few places to which it can be shipped. Consequently prices show further declines. We quote as follows for delivery at consuming points in this district:

No. 1 heavy melting steel	$11.00
Scrap rail	$10.00 to 10.50
Steel rails, rerolling	14.00 to 15.00
No. 1 low phos., heavy 0.04 and under	17 00 to 18.00
Car wheels	18.00 to 19.00
No. 1 railroad wrought	14.00 to 15.00
No. 1 yard wrought	13.00 to 14 00
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	8.00 to 8.50
No. 1 busheling	11.50 to 12.00
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	7.50 to 8.00
Mixed borings and turnings (for blast furnace use)	7.00 to 7.50
Machine-shop turnings (for rolling mill and steel works use)	7.50 to 8.00
Heavy axle turnings (or equivalent)	9 00 to 10.00
Cast borings (for rolling mills)	9.00 to 9 50
Cast borings (for chemical plants)	No market
No. 1 cast	17.50 to 18.00
Railroad grate bars	12.50 to 13.00
Stove plate (for steel plant use)	12 00 to 12.50
Railroad malleable	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications)	12.50 to 13.00
Iron car axles	No market
Steel car axles	No market

Cincinnati

CINCINNATI, June 21.

Pig Iron.—The market was very quiet during the week. A sale of 320 tons of iron to the National Cash Register Co., Dayton, Ohio, and two others of 200 and 100 tons respectively, were the largest reported. A sale of 100 tons of 50 per cent ferrosilicon was also made at around $72, delivered. Inquiries are confined almost entirely to carload lots, though a Central Ohio melter has made an offer on several hundred tons and will buy if the iron can be had at his figure. While reports of $20 iron are being heard from Chicago and lake furnaces, these are not being too seriously regarded, as one of the lake furnaces mentioned in this connection lost an order last week where a quotation of $21.75, furnace, would have clinched it. Chicago iron is being quoted into this district at $21, and much of the iron sold comes from that district. St. Louis district stacks are reported to be on the same basis. Southern Ohio furnaces are still quoting $23, Ironton, but are losing on business outside of their immediate territory. Carload sales of Southern iron are still being sold at $22, Birmingham. A few carloads of resale silvery iron were disposed of during the week at around $32, furnace. There is no demand for basic.

Based on freight rates of $4.50 from Birmingham and $2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$26.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	26.50
Ohio silvery, 8 per cent sil	38.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	25.52
Basic, Northern	24.52
Malleable	25.52

Finished Material.—There is very little activity. Carload business continues to be the rule with an occasional inquiry for 50 to 100 tons. Prices are holding firmly with the exception of sheets. Blue annealed sheets are being pretty generally quoted at 2.90c; black sheets at 3.65 to 3.75c. and galvanized sheets at 4.50c. Manufacturers with heavy stocks of materials are reselling wherever possible at prices below those quoted by mills, which tends to demoralize the market. Some mills are offering material direct to consumers at lower prices than jobbers are able to quote. It is reported that some of the smaller mills are offering wire nails on a 2.90c. mill base, making them, laid down in Cincinnati, $3.15 per keg as against $3.33 on the $3, Pittsburgh, quotation. Shading of prices is also reported, but definite confirmation is hard to secure. There is very little activity in the structural market, the awards being for small tonnages. A number of projects however, are being talked of, including a hotel building at Columbus, Ohio, a Masonic temple and Elk's hall for Louisville, Ky., and a 100-room hotel at Middlesboro, Ky. An armory at Indianapolis for the Indiana National Guard is also expected to be up shortly. The American Rolling Mill Co.'s plant at Middletown, Ohio, closed down Saturday and will reopen July 5. The plant of the Andrews Steel Co. and Newport Rolling Mill Co. will operate at the same rate as has been maintained for the past several weeks and the plant of the Whitaker-Glessner Co., Portsmouth, Ohio, is scheduled for a 45 per cent operation. The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio, has secured an order for a large number of aerial dump cars for the South Manchurian Railroad and a number of employees will be taken on to get the order out. This company recently shipped 40 of these cars to Formosa.

Warehouse Business.—A slight improvement is noticed, but the market is still spotty. Local wire jobbers have reduced the prices on nails to $3.50 per keg, base. Black sheets have been reduced 25c. per 100 lb. and are quoted at 5.25c. Further reductions in sheet prices are anticipated.

Iron and steel bars, 3.35c. base; hoops and bands, 4.05c. base; shapes, 3.45c. base; plates, 3.45c. base; reinforcing bars, 3.42½c. base; cold rolled rounds, 1½ in. and larger, 4.85c.; under 1½ in. and flats, squares and hexagons, 5.35c.; No. 10 blue annealed sheets, 4.35c.; No. 28 black sheets, 5.25c.; No. 28 galvanized sheets, 6.50c.; wire nails, $3.50 per keg base; No. 9 annealed wire, $3.60 per 100 lb.

Coke.—Some activity was reported in the coke market. One agency reports the sale of approximately 3000 tons of furnace coke, and another 12 cars of the same material. The latter sale was made at $3.40, Connellsville. Foundry coke is quoted at $4 to $5; Wise County $5 to $6; New River $8.50 to $9. By-product coke is being quoted on a $6, Connellsville, basis.

Old Material.—The scrap market is showing some signs of life. One of the steel companies in this district is in the market for a small tonnage of steel, and a sale of a small tonnage of re-rolling rails is also reported. Iron axles are down $2, and all other grades 50c.

We quote dealers' buying prices:

Per Gross Ton	
Bundled sheets	$7.00 to $8.00
Iron rails	16.00 to 17.00
Relaying rails, 50 lb. and up	30.00 to 31.00
Rerolling steel rails	11.00 to 12 00
Heavy melting steel	9.50 to 10.50
Steel rails for melting	10.00 to 11.00
Car wheels	13.50 to 14.50
Per Net Ton	
No. 1 railroad wrought	9.50 to 10.50
Cast borings	4.50 to 5.00
Steel turnings	3.00 to 3 50
Railroad cast	13.00 to 14.00
No. 1 machinery	13.00 to 14.00
Burnt scrap	7.50 to 8.50
Iron axles	18.00 to 18.50
Locomotive tires (smooth inside)	9.50 to 10 50
Pipes and flues	7.00 to 7.50

New York

NEW YORK, June 21.

Pig Iron.—An explanation of the willingness of furnaces to take on iron at low prices is that there are still so many contracts made at high prices on which iron has not been delivered that furnaces are encouraging deliveries by granting concessions so that the average of old and new contracts will not be high. Limited tonnages of Virginia iron have sold at $25, furnace base. Buffalo iron is offered for sale as low as $20.75 furnace for No. 2 X and even lower prices are rumored. Steel companies in Buffalo now seem to be more active than merchant furnaces in trying to sell iron. An inquiry for 1000 tons of foundry iron for export to Japan has been received. It would be possible to import foreign pig iron at low prices, but there is no demand for it. The general situation continues to be one of extreme dullness.

We quote delivered in the New York district as follows, having added to furnace prices $2.52 freight from eastern Pennsylvania, $5.46 from Buffalo and $6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	$27.52 to $28.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	26.52 to 27.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	25.52 to 26.52
Buffalo, sil. 1.75 to 2.25	26.46 to 27.46
No. 2 Virginia, sil. 1.75 to 2.25	29.16 to 30.16

Finished Iron and Steel.—With the exception of a slightly better inquiry for steel buildings, there is no note of improvement in the local steel market. Prices are soft. On 200 tons of plates for China a bid was put in on a c.i.f. basis that figured back to about 1.80c., Pittsburgh. Domestic business has not brought out any important price cuts, but there have been concessions on various products, especially plates, sheets and wire products. Nails have been sold a shade below $3 a keg. Railroad car companies are confident that some fairly good orders for car repairs will be placed shortly after July 1. Inquiries for structural work include the following: Theater, Lebanon, Pa., 250 tons; airplane hangars for War Department, 1500 tons; bridges, Philadelphia & Reading Railroad, 300 tons; office building, Trenton, N. J., 300 tons; office building in Twenty-fifth Street, New York, 500 tons; a section of the New York-New Jersey tunnel, 500 tons; apartment house at Scarsdale, N. Y., 250 tons; garage in Brooklyn, 300 tons. The American Bridge Co. was awarded a highway bridge on Long Island, 300 tons, and the McClintic-Marshall Co. was awarded a New York Central Railroad bridge, 100 tons. The Bethlehem Steel Bridge Corporation was low bidder on a bridge for the Delaware & Lackawanna Railroad, 400 tons.

Prices unchanged. We quote for mill shipments, New York, as follows: Soft steel bars, 2.38c. to 2.48c.; plates, 2.28c. to 2.58c.; structural shapes, 2.38c. to 2.58c.; bar iron, 2.28c.

Ferroalloys.—Demand for both ferromanganese and spiegeleisen is entirely absent, there being no inquiries reported and no sales recorded. Quotations are unchanged and nominal. There is no demand for manganese ore, the quotation for which continues nominal, but it is believed that any buying would be possible as low as 20c. per unit, seaboard. Importations continue heavy, those for May being 54,000 tons and the rate for the 11 months ended with May having been over 60,000 tons per month, the largest ever recorded. There is an inquiry for 25 tons of 50 per cent ferrosilicon which seems to be the only business before the trade. Quotations are as follows:

Ferromanganese, domestic, delivered, per ton	$80.00
Ferromanganese, British, seaboard, per ton	$75.00
Spiegeleisen, 20 per cent, furnace, per ton	$30.00 to $32.00
Ferrosilicon, 50 per cent, delivered, per ton	$69.00 to $70.00
Ferrotungsten, per lb. of contained metal	48c. to 58c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr.	16c. to 16.50c.
Manganese ore, foreign, per unit, seaboard	22.50c.

Warehouse Business.—The dullness of the market continues with few price changes reported. One warehouse, in accordance with the new quotation of some mills on cold rolled bars, is now quoting 4.38c. per lb. for rounds and 4.98c. per lb. for squares and hexagons. Trading between dealers to maintain complete stocks continues. It is expected in some quarters that when some mills close down for inventory, July 1, they may remain closed for the month and warehouses will be enabled by this cessation to make some noticeable reductions in stock. We quote prices on page 1740.

High Speed Steel.—Improvement is slight. One producer notes the appearance of small orders from customers who have shown no inclination to purchase for some time past. Quotations generally range from 90c. to $1 per lb. for 18 per cent tungsten high speed steel.

Cast-Iron Pipe.—The city of Baltimore will open bids for 1500 tons of 3 to 16-in. pipe on June 27. There is an inquiry for a fair tonnage of 27½-in. specials for export. Prices remain firm on small lots, though attractive business might bring out lower prices. Prices for carload lots, f.o.b. New York, follow: 6-in. and larger, $53.30; 4-in. and 5-in., $58.30; 3-in., $68.30, with $4 additional for Class A and gas pipe.

Old Material.—One New York broker is paying $7.50 for heavy melting steel, though $7 is the more common price. The flurry in stove plate has subsided. Cast scrap has been the most active item. The market as a whole is inactive and it is believed that the bottom has been reached.

Buying prices per gross ton, New York, follow:

Heavy melting steel	$7.00 to $7.50
Rerolling rails	10.00 to 10.50
Relaying rails, nominal	37.50 to 40.00
Steel car axles	10.50 to 11.00
Iron car axles	17.00 to 18.00
No. 1 railroad wrought	10.50 to 11.00
Wrought iron track	7.25 to 7.50
Forge fire	5.00 to 5.50
No. 1 yard wrought, long	8.50 to 9.00
Light iron	2.00 to 2.50
Cast borings (clean)	3.00 to 3.50
Machine-shop turnings	2.50 to 3.50
Mixed borings and turnings	2.50 to 3.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	8.00 to 8.50
Stove plate	9.00 to 9.50
Locomotive grate bars	8.50 to 9.00
Malleable cast (railroad)	8.00 to 8.50
Old car wheels	12.50 to 13.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	$16.00 to $17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	14.00 to 15.00
No. 1 heavy cast, not cupola size	11.00 to 12.00
No. 2 cast (radiators, cast boilers, etc.)	9.50 to 10.50

San Francisco

SAN FRANCISCO, June 15.

Pig Iron.—Two or three sales worthy of mention have been recorded in the past two weeks. The largest transaction involved 800 tons of Belgian pig iron, which sold on the basis of $31.75, ex-ship, San Pedro. The Southern Pacific Co. recently entered the market for 500 tons of No. 3 foundry and it is understood that the price was in the neighborhood of $20, Birmingham. An offer of $25, ex-ship, was received for 500 tons of German iron but no business resulted since the price was considered too low. Some shrinkage of stocks in this vicinity has been observed, but they are still ample.

Coke.—Some little movement of coke is reported, but there is no active demand. Foundry activity is confined to a narrow, replacement business. The Southern Pacific Co. is asking bids on 500 tons of domestic material. Recently a trans-bay foundry sold about 150 tons in small lots to various operators at around $23, foundry. This action was incident to disbanding local activities.

Cast Iron Pipe.—There has been no marked recovery; in fact, a settling tendency has been observed. A cut of $10 in the base price became effective the latter part of May, the present quotation being $45. The most outstanding prospect in sight is a Government order for 6000 ft. of 8-in. pipe to be used at Fort Mason, San Francisco. Bids will open June 22. Phoenix, Ariz., is calling for new bids to-day on its April order. The contemplated railroad freight reduction to $1.05 per hundred is not expected to offer any active competition with water transportation.

Finished Iron and Steel.—The persistence of the lockout declared by the local Building Trades' Council has exerted a depressing influence. At present, however, there is some hope of a resumption of building activities, as the council has agreed to accept the 7½ per cent wage reduction, but is actively opposing the establishment of an open shop in San Francisco. As

indicated in a previous report, there are several large construction jobs pending, together with smaller building work in plenty, and coast steel interests are expecting a revival when this labor trouble is settled. No price changes have been reported, the Columbia Steel Co. still quoting reinforcing bars at $2.35, mill California, but doing little business. Jobbers report a narrow demand and very small replacement buying.

Old Material.—This remains an extremely dull market. No sales of any note have been reported of late. The greatly restricted operations of foundries and their liberal stocks of scrap on hand are discouraging factors. Prices are nominal and are estimated at about $10.50 to $11 per gross ton, delivered at the mill, for heavy melting steel and around $25 for cast iron scrap.

Cleveland

CLEVELAND, June 21.

Iron Ore.—As stated elsewhere in this issue, ore prices have been established at $1 below those of 1920.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, $6.45; Old range non-Bessemer, 51½ per cent iron, $5.70; Mesabi Bessemer, 55 per cent iron, $6.20; Mesabi non-Bessemer, 51½ per cent iron, $5.55.

Pig Iron.—The price reduction of $1 a ton on iron ore has had no effect on pig iron prices, as a cut to that extent was discounted by furnace interests weeks ago and this expected reduction was probably of only minor influence in helping to bear down pig iron prices during the last few months. The reduction in ore has cut the cost of making pig iron approximately $2 a ton, but with this reduction sellers claim that the present prices are still below the cost of production. It is of interest to note that when prices of ore were fixed early in February last year, Bessemer pig iron was selling at $41 and basic and foundry iron at $40, Valley furnace. The past week has been one of the quietest weeks of the year in the volume of sales. The only activity reported is a few car lot orders for foundry iron. Prices are weak and some business has been taken at $22 for No. 2, a decline of 50c. from the previous week. Quotations now range from $22 to $23. Inquiries are very light, the only one of any size being for 250 tons of foundry iron from the Union Radiator Co., Johnstown, Pa. Foundry conditions show no improvement. Shipments are about the same as they have been for the past few weeks. The 500-ton sale of Southern iron to the Standard Sanitary Mfg. Co. for its Louisville plant reported last week was made on the basis of $22, Birmingham. Since this business was taken, a slightly lower price is understood to have appeared.

We quote delivered Cleveland as follows, based on the new freight rate, there being a 56c. switching charge for local iron, a $1.96 freight rate from Valley points, a $3.36 rate from Jackson and $6.67 from Birmingham:

Basic	$22.96
Northern No. 2 fdy., sil. 1.75 to 2.25	$23.50 to 24.50
Southern fdy., sil. 2.25 to 2.75	29.92
Ohio silvery, sil. 8 per cent	38.86
Standard low phos., Valley furnace	$38.50 to 39.00

Semi-Finished Steel.—There is no activity in the semi-finished steel market, but it seems to be the general opinion that a $35 price would be quoted on an inquiry for billets, sheet bars or slabs.

Finished Iron and Steel.—The buying of finished iron and steel is in very limited volume and consumers seem to be convinced that there will be further price reductions around July 1. This attitude is apparently holding back some business. Numerous reports of price concessions are still in circulation, but these generally lack confirmation as far as this territory is concerned. Tank plates in the small sizes can be bought at 2c., but there is no positive evidence that large tank plates or boiler plates are being shaded, although a round lot inquiry would probably bring out some concessions. An inquiry is pending for 1000 tons for oil tank work. Some fabricators are evidently using the 2c. steel as a basis for quoting structural work, perhaps anticipating a price reduction and desiring to reduce their stocks. Reports from Detroit indicate that some of the automobile manufacturers have increased production, recent price cuts having apparently stimulated sales. It is understood that the Ford Motor Co. plans to operate its plant at full capacity during July. In structural lines buildings requiring several thousand tons of steel are still pending in this territory, and considerable new work came out during the week. The air service of the Army will take bids June 23 for 16 hangars requiring 2000 to 3000 tons, and there is an inquiry out for 1500 tons of steel for a plant for the United States Sheet & Window Glass Co., Shreveport, La., and another for 200 tons for the Glenville High School, Cleveland. The McMyler-Interstate Co., Cleveland, has taken the 400-ton gantry crane for the Army requiring 1200 tons of steel. The general contract for the Commodore Perry Hotel, Akron, requiring 550 tons has been placed with the George A. Fuller Co. A Cleveland apartment hotel will require 300 tons of reinforcing bars and a reservoir at Willoughby 130 tons. Hard steel bars are weak with 1.90c. now about the maximum price and quotations ranging down to probably 1.75c. Hard steel angles and channel flats are quoted at 1.90c.

Cleveland warehouses quote steel bars and small shapes at 2.99c.; plates, 3.09c.; structural shapes, 3.09c.; No. 9 galvanized wire, 3.95c.; No. 9 annealed wire, 3.50c.; No. 28 black sheets, 4.80c.; No. 28 galvanized, 5.70c.; No. 10 blue annealed, 3.85c. to 4c.; hoops and bands, 3.69c.; shafting, 4.25c.

Coke.—The demand is limited to car lot sales of foundry coke and orders are very light. Prices range from $4.50 to $5 at oven for standard Connellsville makes.

Bolts, Nuts and Rivets.—Bolt and nut prices are weak and definite inquiries have brought out quotations of from 5 to 10 per cent below regular prices. However, makers are not inclined to make a formal price reduction at present. With the irregularity in the market, present regular prices are largely nominal. While the volume of business shows no improvement, manufacturers look for some railroad buying next month and consequently are a little more optimistic than they have been. Rivets have further declined to $3 for structural and $3.10 for boiler rivets for car lots. Quotations on smaller lots are from $2 to $5 a ton higher. A car lot sale of structural rivets is reported at 2.75c.

Old Material.—Prices have further declined on most grades, but otherwise the market shows no change. A number of the dealers are making virtually no effort to do business. The only activity reported is the purchase of mixed borings and turnings and compressed steel in lots of 500 tons and under by the Weirton Steel Co. Very little material is being accepted by mills on old contracts. Dealers are picking up car lots of heavy melting steel at $10. An Ohio consumer has purchased a few car lots of low phosphorus melting steel at $13 delivered. Compressed steel has declined sharply as a result of the falling off in the demand for this grade due to the filling of a Youngstown order. Light bundled sheet stampings are down so low that Detroit producers are reported to be giving this scrap away to get rid of it.

We quote per gross ton delivered consumers' yards in Cleveland and vicinity as follows:

Heavy melting steel	$10.50 to $11.00
Steel rails, under 3 ft.	11.50 to 12.00
Steel rails, rerolling	13.00 to 14.00
Iron rails	11.00 to 12.00
Iron car axles	18.00 to 19.00
Low phosphorus melting scrap	12.50 to 13.00
Cast borings	7.50 to 8.00
Machine shop turnings	4.50 to 4.75
Mixed borings and short turnings	7.40 to 7.65
Compressed steel	6.50 to 7.00
Railroad wrought	10.00 to 10.50
Railroad malleable	11.00 to 12.00
Light bundled sheet stampings	3.50 to 4.00
Steel axle turnings	8.00 to 8.50
No. 1 casting	16.00 to 16.50
No. 1 busheling	7.50 to 8.00
Drop forge flashings, over 10 in.	5.50 to 6.00
Drop forge flashings, under 10 in.	6.00 to 6.50
Railroad grate bars	12.75 to 13.00
Stove plate	12.75 to 13.00
Pipes and flues	6.00 to 7.00

Sheets.—The Republic Iron & Steel Co. has reduced prices on black, blue annealed and galvanized sheets $5 a ton, and the American Sheet & Tin Plate Co. has made a similar reduction on black and galvanized sheets. Before these reductions there was considerable price shading by independent mills and a quotation as low as 4.75c. was reported on galvanized sheets. The demand continues very light. Some of the independent mills are not inclined to meet the new prices and may shut down their plants. A Cleveland mill has taken an export order for 400 tons of black sheets for Japan at

3.75c. Jobbers have not yet reduced warehouse prices, but expect to do so.

Strip Steel.—Makers report some improvement in the demand for hot-rolled strip steel, but prices on this and cold-rolled strips are weak. For fair-sized orders 2.60c. to 2.65c. are quoted on the former and 5c. on the latter.

St. Louis

ST. LOUIS, June 20.

Pig Iron.—If any pig iron were to be sold in this market in any quantity, it could only be done after a cut in price that would justify melters in speculative buying—and that is an impossible situation just now—as there is no new business of either a jobbing or other character developing among the foundries. It is doubtful if foundries are operating even 25 per cent of the district capacity and even the anticipated improvement in the stove molding operations has not materialized to any extent. Nominally pig iron is $22 per ton, Birmingham basis, for No. 2 Southern, but aside from an occasional small odd lot none is being sold at any price. The furnace on the west side is still out of blast, while that on the east side, after supplying its allied industry, is able to dispose of its small surplus without difficulty at prices which prevent either southern or northern iron from entering this immediate vicinity.

Coke.—The complete lack of activity in pig iron finds its natural accompaniment in the coke market as there is no buying going on and no contracting ahead for the last half save in a small lot here and there that really cannot be counted as having any bearing on the market. The prices quoted are nominal, because of the lack of actual transactions.

Finished Iron and Steel.—There has been no noteworthy increase in interest either in contracts or immediate delivery from warehouse. There has been no change in the building situation and structural material is finding little or no outlet. No change has been reported in contract prices.

Method of Notching Steel Ingots

A description of the installation designed by the authors and used for notching steel ingots preparatory to breaking under an eccentric press appears in *L'Industria* for May 31, 1920. An abstract in *Technical Review*, London, follows:

The method consists in arranging the ingots or billets in layers on an insulated wood trestle, center-punching them to show where the notching has to be effected and then subjecting them to the action of an electric arc, which hollows out the metal and weakens the cross-section of the ingot or billet, with the result that it can be broken under the press with considerably less power than would otherwise be required.

In the actual plant used, the lighting current was transformed so as to give an amperage of 400 amperes. The current is led to a switchboard from which two flexible cables run to the site of operations. One of these leads terminates in an iron contact plate and the other passes to a special water resistance. The burner is formed of a copper strip, one end containing a handle and the other a terminal for the carbon. Considerable difficulty having been experienced with the rapid consumption of carbons, it was decided to coat them with copper, but this method had ultimately to be abandoned owing to the deleterious fumes produced. The carbon was subsequently placed in a thin-walled iron tube. The arc is first of all struck between the billet and the iron sheath of the carbon, the molten metal dropping on the billet. Gradually the carbon is uncovered and heats up and so melts the sheath for about 1 in. up. The tip of the carbon is thus at a high temperature while the remainder, in the sheath, is comparatively cool.

The hollow burned in the billet has the appearance of a crater 15 to 20 mm. diam. The only result of the arc treatment on the billet is to cause local hardness over a very small area of the surface of the metal.

Unemployment in Steel Mills Increases

WASHINGTON, June 21.—A decrease of 1.4 per cent was shown in the number of employees in 115 iron and steel establishments in May, 1921, as compared with April, according to the Bureau of Labor Statistics, Department of Labor. The number in May was 111,101 as compared with 112,713 in April, the half-month payrolls for the respective periods being $5,434,846 and $5,743,075, a decline of 5.4 per cent. When compared with one year ago the declines are especially marked. In May, 1920, the number of men engaged in 111 iron and steel establishments was 166,296, as compared with 111,123 in May, 1921, a decline of 33.2 per cent. The decrease in the half-month payroll (of $12,341,536 and $5,419,536, respectively) was 56.1 per cent. The largest decrease in number of employees was 41 per cent, reporting by car building and repairing plants in May as compared with last year.

Month	—Number of— Establishments	—Number of— Men	Half-Month Payroll	Average Pay Envelope
Iron and Steel				
May, 1921.....	111	111,123	$5,419,262	$48.77
April, 1921.....	115	112,713	5,743,075	50.95
May, 1920.....	111	166,296	12,341,536	74.21
Automobiles				
May, 1921.....	46	87,266	*2,921,215	33.48
April, 1921.....	46	83,556	*2,665,106	31.90
May, 1920.....	44	128,982	*4,471,040	34.67
Car Building and Repairing				
May, 1921.....	62	44,027	2,889,152	65.62
April, 1921.....	62	45,554	3,059 184	67.16
May, 1920.....	60	69,577	4,371,966	62.84

*Weekly.

Commenting on changes in wage rates and per capita earnings in the iron and steel industries during the period April 15 to May 15, the report says:

Three establishments made wage rate decreases of 25 per cent, 18 per cent and 16⅔ per cent, affecting the entire force. In one concern practically all laborers were reduced 17½ per cent, while a 10 per cent reduction was made to those engaged in other occupations. Thirty per cent of the men in one plant were reduced 15 per cent; 95 per cent of the men in a second plant, approximately 14 per cent; while in a third plant 40 per cent of the men were reduced 12½ per cent. Four plants reported a decrease of 10 per cent, affecting the entire force in two plants, and 75 per cent and 50 per cent of the forces in the other two. A reduction of 8.9 per cent was made to 42 per cent of the employees in one concern. A decrease of 8 per cent was reported by two mills, affecting 42 per cent and 40 per cent of the forces respectively. The entire force of another mill was reduced 7½ per cent. In one establishment, the hot mill department was reduced 7 per cent. Less time was reported for this industry, due to irregular operations. The per capita earnings for May show a decrease of 4 per cent when compared with April.

Will Resume Hearing in Ferromanganese Case

WASHINGTON, June 21.—Hearing in the so-called ferromanganese anti-dumping case will be resumed on June 28 or 29 before Examiner Averill, Federal Trade Commission, at the Commission's office in New York, 28 West 38th Street, where respondents will present their side. The Commission completed its testimony in February, when hearings were postponed at the request of the respondents. Taking of evidence will be finished at the New York hearing unless respondents decide to obtain testimony from ferromanganese makers in England, in which instance hearings will be brought to an end in that country.

The Woonsocket Machine & Press Co., 533 Second Avenue, Woonsocket, R. I., is operating its foundry as an open shop. Union officials, who for many weeks conducted a strike, recently declared the strike off after the strikers' places were filled with new molders. During the labor trouble, the company had its castings made in outside foundries, chiefly the Fairmount Foundry & Machine Works, Woonsocket.

British Iron and Steel Market

Hope of Cheaper Fuel Fading—Production Almost Ceased—Continental Prices Capture Orders

(By Cable)

LONDON, ENGLAND, June 21.

Coal situation is very disappointing. The leaders of the striking colliers are now endeavoring to bring about an entire cessation of all industry. Very few miners have returned to the pits to work.

Pig iron producers are now apprehensive that any settlement of the coal strike will not include a reduction in fuel prices, in which case no immediate resumption in the manufacture of pig iron is expected, unless the demand should cause an advance in iron prices. The export business is quite stagnant. Hematite stocks are still considerable and makers are cutting quotations for shipment.

Steel makers, anticipating a resumption of activity, have reduced home prices on ship plates, boiler plates and sections; but any attempt at export business is impracticable, owing to cheap Continental offerings. German billets are selling at £6 6s. ($23.75) c.i.f. East coast; sheets at £8 5s. ($31.10) f.o.b. Belgian quotations have been reduced to meet the German figures. Belgian bars are quoted at £8 5s. ($31.10) f.o.b.

New Zealand has placed orders here for 45 locomotives, 2500 railroad cars and 12,000 tons of rails.

Tin plates are firmer, buyers of 28 x 20's paying £2 14s. ($10.18) f.o.b. Wasters are sold at £1 2s. ($4.15) basis f.o.b. Quarter wasters are nominally 18s. ($3.39) f.o.b. Japan is inquiring for a fair tonnage under the usual specifications. Galvanized sheets have been advanced in hope of attracting orders, but no substantial inquiries have been developed.

We quote per gross ton except where otherwise stated, f.o.b. maker's works, with American equivalent figured at $3.77 per £1 as follows:

Durham coke	£2	2					$7.92	
Cleveland basic	6	0					22.62	
Cleveland No. 1 foundry	6	5					23.56	
Cleveland No. 3 foundry	6	0					22.62	
Cleveland No. 4 foundry	5	19					22.43	
Cleveland No. 4 forge	5	17½					22.15	
East Coast mixed	8	0	&	£7	5*		30.16 &	$27.33
Ferromanganese	18	0	&	15	0*		67.86 &	56.55
Ship plates	15	0	to	15	10		56.55 to	58.44
Boiler plates	21	0	to	24	0		79.17 to	90.48
Tees	15	0	to	15	10		56.55 to	58.44
Channels	14	5	to	14	15		53.72 to	55.61
Beams	14	0	to	14	10		52.78 to	54.67
Round bars, ¾ to 3 in.	14	10	to	16	10		54.67 to	62.21
Rails, 60 lb. and up	13	0	to	15	0		49.01 to	56.55
Billets	11	0	to	11	10		41.47 to	43.36
Sheet and tin plate bars, Welsh	11	0	to	11	10		41.47 to	43.36
Galvanized sheets, 24 g.	23	0	to	24	0		86.71 to	90.48
Black sheets	19	0	to	20	0		71.63 to	75.40
Tin plate base box	1	6	to	1	9		4.90 to	5.47
Steel hoops	17	10	to	20	0		65.98 to	75.40

*Export price.

Coal Strike and Foreign Competition Paralyzing Business—War Vessels for Scrap

LONDON, ENGLAND, June 1.—The coal strike still drags on and all attempts to bring the parties together have been abortive. In the iron and steel trade, business is virtually at a standstill, the fuel supply of most works being exhausted. Certain of the shipyards and engineering shops are able to carry on but with limited working hours. There seem to be a few orders for manufactured materials which cannot be filled and quotations now bear a "strike clause." Of course business is being held up not only on account of the strike, but also because consumers feel that owing to the competition of foreign material, large concessions must be made in the prices of British steel. The present position is such that, in certain sections of the industry, Germany can produce the finished article at the same price as it costs here for the coal and pig iron. It is obvious that production costs in this country must be brought down and that every avenue towards this end must be pursued. As the chairman of Cammell Laird & Co. is reported to have said in an interview recently, "economies must be effected, profits curtailed, every profitable development must be carried out with organizations keyed up to the highest point of efficiency, but," he continued "everything that can be effected in this direction would not suffice to reduce our prices to a level of those of some of our principal foreign competitors."

Meantime it is understood that continental makers have adopted a more independent attitude owing to the British works being out of the market and have advanced their prices. This is, of course, partly due to the improvement in the exchange rate of the franc and it looks as if these higher prices would give Germany an opportunity to get in.

What is reported as the biggest deal ever made between the Admiralty and a private firm for a sale of war vessels has been concluded with Messrs. T. W. Ward, Ltd., Sheffield. This firm is reported to have purchased from the government at a flat rate of £2.10 per ton on actual displacement of all the vessels included in the contract, 5 battleships, 6 cruisers, 6 light cruisers, 3 flotilla leaders, 72 torpedo boat destroyers, and 13 torpedo boats and 8 monitors, a total of 113. It is interesting to note that the battleships include the Dreadnought which gave its name to a certain type. Messrs. Ward have, of course, been in the habit of buying obsolete vessels for breaking up having several huge yards fitted with the latest machinery.

It is stated that a report that a process employing pulverized coal instead of coke has been devised by a French engineer, M. Basset, for making steel direct from the ore, is attracting some attention in Sheffield, although metallurgists are inclined to be cautious, knowing that direct processes have been tried before and failed to come up to practical requirements.

Preparing for Hearings in Pittsburgh Plus Case

WASHINGTON June 21.—Plans are under way for agreement between the Federal Trade Commission and the Steel Corporation as to the character of evidence to be presented in the Pittsburgh plus hearings, which probably will begin some time in August. The Commission is still making a study of the case with a view to determining what it will endeavor to develop. It is going over data such as cost of production at Steel Corporation plants, submitted voluntarily to the Commission several years ago, and may use some of these figures. Where there is no disagreement between the Steel Corporation and Commission on given points, they will be eliminated with the object of expediting proceedings as much as possible. It is stated to-day that while they will be comparatively of long duration, they will be finished earlier than has been expected.

The new rules of practice of the Commission do not affect the respondents adversely, but simply give more authority to the examiner in charge, who, like examiners of the Interstate Commerce Commission, will prepare a tentative finding of facts or proposed "cease and desist" order, or recommend dismissal, for submission to the Commission. Attorneys for both sides can file exceptions and argue them at final arguments on the merits of the case. In the past the authority of the examiner was limited to administering oaths, noting exceptions, ruling whether certain evidence was admissible or not and certifying records for the commissioner.

The examiner to sit in the case has not been named, but the trial attorney assigned by the Commission is Harle Steinhauer, who drew up the complaint. Because of the importance of the case it is likely that a member of the Commission, who, some think, will be Chairman Thompson, will sit with the examiner during part of the hearings at some of the steel producing points where they will be held.

MEET WITH SECRETARY HOOVER

Business Paper Editors Confer in Washington—Industrial Changes Since 1913

The third conference of business paper editors with Secretary of Commerce Hoover was held in Washington, Monday, under the auspices of the National Editorial Conference, with President Clay C. Cooper, managing editor *Mill Supplies*, Chicago, presiding.

The editors, numbering about 50, first met at luncheon at the New Willard. J. H. Vandeventer, editor *Industrial Management*, presented the report of the Committee on Standardization. Mr. Vandeventer said that the report consisted of a survey of the general status of a number of industries, which had been made by means of a questionnaire submitted to the editors. No attempt has been made to state definitely the extent to which standardization could be extended, but the report was submitted to Secretary Hoover for his consideration. President Cooper announced that a committee on reorganization had been appointed, consisting of George Smart, THE IRON AGE, Samuel Dunn, *Railway Age Gazette* and L. P. Alford, *Management Engineering*, to render all assistance possible to Secretary Hoover in reorganizing his department.

A. C. Pearson, treasurer United Publishers' Corporation, New York, was called upon and spoke in hearty commendation of the plan of editors meeting with Secretary Hoover, and expressed the hope that they would continue to do so. He also spoke of the postal situation and of the pending effort to get Congress to pass just legislation to relieve publishers of some of the present burden under the zone system.

In the evening, Secretary Hoover was the guest of honor at dinner at the New Willard and spoke at length in regard to industrial conditions. He presented a series of index numbers, showing in tabular form the monthly relative changes during 1920 and the first five months of 1921, as to production in the case of some industries and as to prices and other features in the case of other industries. The numbers are based on data which are already available, either from Government departments, trade associations or trade journals. Secretary Hoover said that the value of this compilation lies in bringing the scattered figures together and in translating them into a form in which monthly comparisons can more readily be made. As far as possible, the relative numbers have been calculated by using the average for 1913 as a base equal to 100. The table for metals and metal products is reproduced on this page. Secretary Hoover called for an expression of opinion by the editors as to the value of the tables and their use. By an almost unanimous vote, the general idea was approved, but some amendments were suggested.

Referring to the conferences which he had held with representatives of numerous industries, Secretary Hoover said that he felt that the results in nearly all cases had been helpful. He expressed his hearty appreciation of the efforts of the trade paper editors.

Secretary Hoover spoke at length on world conditions, dwelling particularly upon difficulties connected with exporting, the unfavorable effects connected with Germany's attempt to comply with the demands of the reparations commission and of the numerous problems which confront the Government. He said that in spite of all that is unfavorable, he does not despair, but looks forward hopefully for a change for the better before many months have passed.

The next meeting will not be held until September, unless Secretary Hoover suggests an earlier date.

Metals and Metal Products

Source	IRON AGE	American Iron and Steel Institute	Department of Commerce IRON AGE	U. S. Steel Corporation	Engineering and Mining Journal	N. Y. Metal Ex. (Metal Digest)	N. Y. Metal Ex. (Metal Digest)	Department of Commerce
	Iron and Steel				Copper	Tin		
	Pig-Iron Production Relative to 1913	Steel Ingot Production Relative to 1913	Iron and Steel Exports Relative to 1913	Unfilled Orders Relative to 1913	Copper Production Relative to 1913	U. S. Stocks Relative to 1913	U. S. Consumption Relative to 1913	Imports, Bars, Blocks, Etc., Relative to 1913
1913 Average ..	100	100	100	100	100	100	100	100
1920 January ..	118	118	143	157	90	186	107	92
February..	117	114	132	161	87	202	142	147
March	132	131	179	167	89	203	140	125
April	107	105	169	175	86	154	90	108
May	117	114	180	185	85	145	97	95
June	119	118	173	186	86	290	178	117
July	120	111	107	188	81	194	151	184
August ...	123	119	185	183	86	104	102	117
September.	123	119	175	176	78	176	133	100
October ...	129	120	194	167	78	202	93	71
November.	115	105	186	153	79	173	93	100
December..	106	93	214	138	71	161	71	62
1921 January ..	95	87	235	128	67	155	43	27
February..	76	69	169	117	64	138	43	55
March	63	62	99	106	67	192	46	32
April	47	48	70	99	35	188	43	26
May	48	50	..	93	..	132	..	21

Cost of Living Still Falling

Reports of the Bureau of Labor Statistics show that the price decline, which started a year ago, continued at a slightly slower rate through May. Metals and metal products were stationary at 138 (compared with 100 as the average value in 1913); this group is still, with the exception of food and of farm products, the lowest of all, and is well below the average. House-furnishing goods and building materials are still the chief obstacles to a return to normal. The following figures, except for the last line, are wholesale, and represent in each case the average for the month.

Index Numbers by Groups of Commodities
(1913 average equals 100)

	May, 1920	April, 1921	May, 1921	A*
Farm products	244	115	117	88.2
Food, etc.	287	141	133	82.4
Cloths and clothing.....	347	186	181	67.2
Fuel and lighting.....	235	199	194	30.4
Metals and metal products..	193	138	138	59 1
Building materials	341	203	202	57.7
Chemicals and drugs.....	215	168	166	42.1
House-furnishing goods	339	274	262	32.2
Miscellaneous	246	154	151	65.1
Total	272	154	151	70.3
RETAIL FOOD	215	152	145	62.2

*A represents the percentage drop, in one year, of the excess of May, 1920, over the average for 1913.

Retail costs announced by the National Industrial Conference Board are based on a different lineup of items, and are retail. They record a peak in July, 1920, at 104.5 per cent above the cost for July, 1914. Rents have advanced since last year and have shown no tendency to fall back. Fuel and light still hold part of the increase made last winter. All other items have fallen, month by month. The average cost of living is quoted, as of June 1, at 61.9 per cent above July, 1914, but 20.8 per cent below July, 1920. The figures follow:

	July, 1914	July, 1920	Nov., 1920	March 1, 1921	June 1, 1921
Food	100	219	193	156	149
Shelter	100	158	166	171	171
Clothing	100	266	226	174	167
Fuel and light....	100	166	200	187	187
Sundries	100	185	193	185	185
Total	100	204.5	193	168.7	161 9

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia	$0.35	St. Paul	$0.665
Baltimore	0.335	Omaha	0.815
New York	0.38	Omaha (pipe)	0.44
Boston	0.415	Denver	1.35
Buffalo	0.295	Denver (wire products)	1.415
Cleveland	0.24	Pacific Coast	1.665
Cincinnati	0.265	Pacific Coast, ship plates	1.335
Indianapolis	0.345	Birmingham	0.765
Chicago	0.38	Jacksonville, all rail	0.565
St. Louis	0.475	Jacksonville, rail and water	0.46
Kansas City	0.815	New Orleans	0.515
Kansas City (pipe)	0.44		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver, the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 70c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, $1; wire fencing, netting and stretcher, $1; pipe, not over 8 in. in diameter, 85c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. thick and over, and zees, structural sizes, 2.20c.

Wire Products

Wire nails, $3 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of $1.50 and shorter than 1 in., $2; bright Bessemer and basic wire, $2.75 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.75; galvanized wire, $3.45; galvanized barbed wire, $3.85; galvanized fence staples, $3.85; painted barbed wire, $3.15; polished fence staples, $3.15; cement-coated nails, per count keg, $2.60; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 60½ to 63 per cent off list for carload lots, 59½ to 62 per cent for 1000-rod lots, and 58½ to 61 per cent for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....$3.00
Large boiler rivets.....3.10
Small rivets.....60, 10 and 10 per cent off list
Small machine bolts, rolled threads, 60, 10 and 10 per cent off list
Same sizes in cut threads.....60 and 10 per cent off list
Longer and larger sizes of machine bolts..60 per cent off list
Carriage bolts, ⅝-in. x 6-in.:
Smaller and shorter, rolled threads..60 and 5 per cent off list
Cut threads.....50, 10 and 5 per cent off list
Longer and larger sizes.....50 and 10 per cent off list
Lag bolts.....65 per cent off list
Plow bolts Nos. 1, 2 and 3 head....50, 10 and 5 per cent off list
Other style heads.....20 per cent extra
Machine bolts, c.p.c. and t. nuts ⅜-in. x 4-in.:
Smaller and shorter.....50, 10 and 5 per cent off list
Longer and larger sizes.....50 and 5 per cent off list
Hot pressed sq. or hex. blank nuts.....$4.00 off list
Hot pressed nuts, tapped.....$3.50 off list
C. p. c. and t. sq. or hex. nuts, blank.....$4.00 off list
C. p. c. and t. sq. or hex. nuts, tapped.....$3.50 off list
Semi-finished hex. nuts:
¼ to 9/16 in. inclusive U. S. S....80 and 10 per cent off list
Same sizes S. A. E.....80, 10 and 10 per cent off list
⅝ to 1 in. inclusive U. S. S. and S. A. E., 70, 10 and 10 per cent off list
Stove bolts in packages.....80 and 10 per cent off list
Stove bolts in bulk.....80, 10 and 2½ per cent off list
Tire bolts.....65, 10 and 10 per cent off list
Track bolts.....4.35c. base

Square and Hex. Head Cap Screws

½ in. and under.....70 per cent off list
9/16 in. to ¾ in.....70 per cent off list

Set Screws

½ in. and under.....70 and 5 to 70 and 10 per cent off list
9/16 in. to ¾ in.....70 per cent off list

Rivets

Rivets, 1c. per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs, 25c. extra to buyers not under contract; small and miscellaneous lots less than two tons, 25c. extra; less than 100 lb. of a size, or broken kegs, 50c. extra.

All prices carry standard extras f.o.b. Pittsburgh.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $48; chain rods, $48; screw stock rods, $53; rivet and bolt rods and other rods of that character, $48; high carbon rods, $58 to $73, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, $3.25 to $3.40 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, ½-in., ⅝-in., and 7/16-in., $3.40 base; 5/16-in., $3.40 base. Boat and barge spikes, $3.40 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, $4.35 base per 100 lb. Tie plates, $2.50 per 100 lb.; angle bars, $2.75 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., $12.30 per package; 8-lb. coating, I. C., $12.60; 12-lb. coating, I. C., $14.30; 15-lb. coating, I. C., $15.30; 20-lb. coating, I. C., $16.55; 25-lb. coating, I. C., $17.80; 30-lb. coating, I. C., $18.80; 35-lb. coating, I. C., $19.80; 40-lb. coating, I. C., $20.80 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.10c. from mill. Refined bar iron, 2.75c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛	50½	24	¼ to ⅜	+2½	+28½
¼ to ⅜	52½	26	½	27½	9½
½	56½	42	¾	33½	18½
¾	60½	48	1 to 1½	35½	20½
1 to 3	62½	50			

Lap Weld

2	54½	42	2	30½	16½
2½ to 6	58½	46	2½ to 6	33½	20½
7 to 12	54½	41	7 to 12	29½	16½
13 to 14	45	..			
15	42½	..			

Butt Weld, extra strong, plain ends

⅛	46½	29	¼ to ⅜	+10½	+43½
¼ to ⅜	48½	31	½	26½	14½
½	53½	42	¾	33½	19½
¾	58½	47	1 to 1½	35½	21½
1 to 1½	60½	49			
2 to 3	61½	50			

Lap Weld, extra strong, plain ends

2	52½	41	2	31½	18½
2½ to 4	56½	45	2½ to 4	34½	22½
4½ to 6	55½	44	4½ to 6	33½	21½
7 to 8	50½	37	7 to 8	24½	12½
9 to 12	45½	32	9 to 12	19½	7½

To the large jobbing trade an additional 1, 5 and 2½ per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		*Charcoal Iron*	
1¾ in.	19½	1½ in.	+10
2 to 2¼ in.	30	1¾ in.	List
2½ to 3 in.	41	2 to 2¼ in.	—10
3¼ to 13 in.	47	2½ to 2¾ in.	—15
		3 to 3¼ in.	—16
		3½ to 4½ in.	—20

Carload Discounts on Standard Commercial Seamless—Cold Drawn

1 in.	56	2 to 2½ in.	17½
1¼ in.	49	2¾ and 4 in.	20
1½ in.	48	4½ to 5 in.	7½
1¾ in.	25		

Hot Rolled

3 to 4 in. 30

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department which will be subject to special negotiations.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed

Cents per Lb.		Cents per Lb.	
No. 8 and heavier	2.80–3.00	Nos. 11 and 12	2.95–3.15
Nos. 9 and 10 (base)	2.90–3.10	Nos. 13 and 14	3.00–3.20
		Nos. 15 and 16	3.10–3.30

Box Annealed, One Pass Cold Rolled

Cents per Lb.		Cents per Lb.	
Nos. 17 to 21	3.65–3.80	No. 28 (base)	3.85–4.00
Nos. 22 to 24	3.70–3.85	No. 29	3.95–4.10
Nos. 25 and 26	3.75–3.90	No. 30	4.05–4.20
No. 27	3.80–3.95		

Galvanized

Cents per Lb.		Cents per Lb.	
Nos. 10 and 11	4.00	Nos. 25 and 26	4.70
Nos. 12 to 14	4.10	No. 27	4.85
Nos. 15 and 16	4.25	No. 28 (base)	5.00
Nos. 17 to 21	4.40	No. 29	5.25
Nos. 22 to 24	4.55	No. 30	5.50

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
Nos. 15 and 16	3.65–3.80	No. 28 (base)	3.85–4.00
Nos. 17 to 21	3.70–3.85	No. 29	3.90–4.05
Nos. 22 to 24	3.75–3.90	No. 30	3.90–4.05
Nos. 25 to 27	3.80–3.95	Nos. 30½ and 31	3.95–4.10

Non-Ferrous Metals

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin	Lead		Zinc	
June	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
15	13.00	13.00	29.87½	4.50	4.25	4.95	4.45
16	13.00	13.00	30.00	4.50	4.25	4.95	4.45
17	12.87½	12.87½	29.25	4.50	4.20	4.95	4.45
18	12.87½	12.87½	....	4.45	4.20	4.95	4.45
20	12.75	12.75	29.00	4.40	4.20	4.95	4.45
21	12.75	12.75	28.75	4.40	4.20	4.95	4.45

New York

NEW YORK, June 21.

Demand for all the metals is still very light. Buying of copper has not improved and prices are lower in some quarters. The tin market has been quiet and fairly steady. The lead and zinc markets continue stagnant with the price tendency easier in the former but fairly firm in the latter.

Copper.—Some sellers of electrolytic report practically no business, while others state that a fair amount of orders, domestic and foreign, particularly the latter, have been taken during the month. Germany and France have been the principal buyers, but the volume for export has been by no means as heavy as in May. There are also reports from some districts, such as Detroit, that manufacturers using copper are fairly busy and by no means pessimistic. An appraisal of the market depends upon the seller's viewpoint. There are those, particularly the large producers, who will not quote the market lower than 13.25c. to 13.50c., delivered, for June-July delivery, while there are one or two willing to meet the present limited demand at 13c., delivered, which we quote as the market, the corresponding New York price being 12.75c. Lake copper is practically on a parity with electrolytic.

Tin.—Except for a fair volume of business on June 15, amounting possibly to 200 tons for future shipment which was sold around 30c., the week has been quiet and without feature. Trading between dealers has been small and consumers have been practically uninterested. Offerings from London have been light and the general course of the market has varied little from that which has characterized it for some weeks, the general situation being that when purchasers desired to buy it has been difficult to obtain the metal and when sellers desired to sell there have been few buyers. The London market continued to fall the past week until to-day spot standard was quoted at £164 10s., future standard at £167 5s. and spot Straits at £165 5s. per ton, or about £3 below the quotations a week ago. Spot Straits, New York, has varied between 29c. and 30c., with the quotation to-day at 28.75c., New York. Arrivals thus far this month have been 930 tons, with the quantity afloat 2000 tons.

Lead.—Both large and small producers report little business and no inquiries, and the market is stagnant. Buyers would have no difficulty in obtaining lead for early delivery at 4.20c. to 4.25c., St. Louis, or 4.40c. to 4.45c., New York, which we quote as the market, the quotation of the leading interest remaining unchanged at 4.50c., both New York and St. Louis. The belief is fairly well founded that prices will go no lower so far as American conditions are concerned, but it is possible that events in London might force the market down.

Zinc.—The market continues lifeless, but prices are steady and practically unchanged from those obtaining a week ago, with prime Western for early shipment quoted at 4.45c., St. Louis, and 4.95c., New York. Buying is confined to small lots for early shipment. There are, however, numerous offerings to buy at 4.40c., St. Louis, but thus far this price has not been established by any sales, producers being unwilling to go below present levels and some of them unwilling to sell even as low as the present market.

Antimony.—Wholesale lots for early delivery are a little lower at 5.12½c., New York, duty paid, with the possibility that an attractive offer would bring out a 5c. price.

Aluminum.—Virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery, is quoted by the leading interest at 28c., f.o.b. plant, while foreign metal of the same analysis is offered by other sellers at 22.50c. to 23.50c., New York.

Old Metals.—Business continues poor, transactions being almost impossible. Values are generally lower. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible	12.50
Copper, heavy and wire	11.25
Copper, light and bottoms	9.75
Heavy machine composition	12.00
Brass, heavy	7.75
Brass, light	5.50
No. 1 red brass or composition turnings	9.00
No. 1 yellow rod brass turnings	5.75
Lead, heavy	3.75
Lead, tea	3.00
Zinc	3.00

Chicago

June 21.—Lead has declined and all the metals have been weaker but there has been hardly enough business to establish a market. There have been some bids by buyers at considerably under the ruling prices but very few of these offers were accepted. Except for a drop in copper wire, the old metals remain unchanged. We quote Lake copper at 13.25c. in carload lots; tin, 30c.; lead, 4.30c.; spelter, 4.60c.; antimony, 7.50c.; On old metals we quote copper wires, crucible shapes, 8c.; copper clips, 8c.; copper bottoms, 7c.; red brass, 7c.; yellow brass, 5c.; lead pipe, 2.75c.; zinc, 2c.; pewter, No. 1, 17c.; tinfoil, 18c.; block tin, 21c., all of these being buying prices for less than carload lots.

St. Louis

June 20.—The non-ferrous markets are easier with lead in car lots quoted at 4.20c. and spelter at 4.35c. In less than car lots lead is quoted at 4.75c. and spelter at 5c. to 5.10c.; tin, 34c.; copper, 13.75c.; antimony, 7.50c. In the Joplin district ores are weaker with zinc blende, basis 60 per cent, selling around $20 per ton; lead, basis 80 per cent, $45 to $50 per ton with no calamine dealt in, because of the prohibitively low price. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 4.50c.; heavy yellow brass, 7.50c.; heavy red brass, heavy copper and copper wire, 9c.; light copper, 8c.; pewter, 15c.; tinfoil, 18c.; zinc, 3c.; lead, 3.50c.; tea lead, 2c.; aluminum, 9c.

Purchasing Agents' Trip

The General Purchasing Agents' Association of Pittsburgh made a trip to Youngstown, Ohio, Tuesday, June 21, combining business with pleasure. The delegates went over the Pittsburgh & Lake Erie Railroad and in the morning visited the plant of the General Fireproofing Co., where luncheon was served by the company at noon. In the afternoon, a visit of inspection was made to the plant of the Republic Rubber Co., and after this an automobile ride was taken around the city to points of interest. In the evening, a banquet was held at Hotel Ohio at which James A. Campbell, president Youngstown Sheet & Tube Co., gave a talk on "The Industrial Situation." He was followed by A. E. Adams, president Dollar Savings & Trust Co. and First National Bank of Youngstown, who talked on "The Financial Situation."

The St. Louis Coke & Chemical Co., operating ovens at Granite City, Ill., which last week entered the St. Louis market with coke for household consumption, has made a contract with the St. Clair County Gas & Electric Co., to supply gas for household consumption to the cities of East St. Louis, Belleville, Collinsville and Edwardsville, Ill. A 6-mile pipe line will be built at an estimated cost of $70,000. This construction work will be done by the Cahokia Gas & Oil Co., a new subsidiary of the American Gas Co. of Philadelphia, which controls the St. Clair County corporation.

PERSONAL

Laird U. Park, president Park & Williams, Inc., pig iron and ore merchants, Philadelphia and Pittsburgh, and Mrs. Park sailed for Europe last Friday for a tour of England, France, Holland and Belgium.

J. F. McGonigal, mechanical engineer, formerly of the Foamite Co., and J. H. Potter, mechanical engineer, a graduate of New York University, have joined the organization of the Terminal Engineering Co., Inc., New York. M. E. Lyle, for many years with the Columbia Graphophone Co., has been elected a vice-president and M. E. Peck, secretary and assistant treasurer of the Terminal company.

Th. H. Nakken, E. E., Rotterdam, Holland, arrived Saturday on the Rotterdam. He experiments in the field of transferring light into electric current. He has come to America to study the latest developments in this field and to purchase additional laboratory equipment. His headquarters while in America will be at 44 Beaver Street, New York, care of the Alliance Transportation Co.

George F. Pettinos, Philadelphia, has returned from a business trip to Europe.

H. B. Wilson has taken charge of the Mahr Mfg. Co.'s branch office at 915 Olive Street, St. Louis. The company makes oil burning equipment and the plant is in Minneapolis.

A. W. Carr, 2013 Callow Avenue, Baltimore, has resigned as treasurer of the Alexander Milburn Co., manufacturer of welding and cutting torches and acetylene generators. He was associated with this company for over three years and is well known throughout Maryland and the District of Columbia.

J. B. Johnston, vice-president and general manager Standard Scale & Supply Co., Pittsburgh, has resigned.

John Crawford, formerly with the Wellman-Seaver-Morgan Co., Cleveland, has become designing engineer in the tank, tractor and trailer division, Ordnance department, U.S.A., to be located in Cleveland.

Joseph G. Shryock, C. E. 1900, associate member American Society of Civil Engineers, designing engineer Belmont Iron Works, Philadelphia, received the honorary degree of master of civil engineering from the Pennsylvania Military College, Chester, Pa., at its one hundredth commencement exercises, June 15.

Fred McFawn, special productions department, the Stanley Works, New Britain, Conn., hardware, has resigned to become director of sales of the Hartmann Trunk Co., Racine, Wis. He is succeeded by Carl Messinger.

W. H. Rastall, trade commissioner, United States Department of Commerce, has returned to this country after nearly three years spent in the Far East investigating the markets for American industrial machinery.

Joseph L. Ballash, has become associated with the tool department of the Commercial Steel & Supply Co., Cleveland, to further its production of the various types of metal cutting tools.

H. I. Lewis, chief engineer Illinois Montague Iron Works, Chicago, has resigned from the Bishop & Babcock Co., Cleveland, to do general consulting and refrigerating engineering for E. A. Burrows, Chicago.

Richard L. Frost, formerly superintendent of the final assembly department of C. H. Wills & Co., Marysville, Mich., has been placed in charge of all factory departments of the company. Charles F. Morgana has been placed in charge of engineering and designing.

D. H. Thomson was re-elected president of the Terry Steam Turbine Co., Hartford, Conn., last week. Other officers elected were: N. L. Snow, vice-president and general manager, and E. B. Bennett, D. H. Thomson, J. L. Thomson, Frank E. Howard, N. D. Prince and Shiras Morris, directors.

H. C. Dunn, formerly with the Linde Air Products Co., New York, has been appointed New York district manager for the Carbic Mfg. Co., Duluth, Minn. Mr. Dunn's offices are at 141-149 Center Street, New York.

Robert Palm, formerly chief engineer Chrome Steel Works, Chrome, N. J., has joined the export department of the Texas Co.

John M. Hartman has resigned from the Aluminum Co. of America to join the engineering staff of the Kewanee Boiler Co., Kewanee, Ill.

B. H. Anibal has resigned as chief engineer of the Cadillac Motor Car Co., Detroit, to become associated with R. H. Collins, former president of the Cadillac company, in the new corporation which Mr. Collins will head, which will be one of the Durant Motors, Inc., units.

T. W. Warner has resigned as president and general manager of the Chevrolet Motor Co., Toledo, and of the Muncie Products Co., Muncie, Ind., both divisions of the General Motors Corporation, and has been made vice-president of the Durant Motors, Inc. He will be succeeded as president of the Chevrolet Company by K. W. Zimmerscheid, Detroit.

F. P. Gilligan, secretary and treasurer Henry Souther Engineering Co. and candidate for president of the American Society for Steel Treating, gave a talk on technical matters relating to steel treating before members of the Hartford chapter, Hartford, Conn., last week. R. K. Newman, secretary Frasse Steel rication of steel, paying particular attention to cold drawing and finishing.

N. J. den Tex, a graduate of the University of Delft, Holland, is now in the United States with the idea of locating permanently in this country, provided he can find a connection in engineering or management work with concerns building automotive material, including internal combustion and steam engines. His itinerary includes Buffalo, Detroit, Cleveland and Chicago, but his headquarters are at the McAlpin Hotel, New York.

Y. T. Yen, Hanyang Iron & Steel Co., Hanyang, China, is visiting this country to inspect iron and steel manufacturing plants and machinery manufactories. He was in Cincinnati recently and, in speaking of conditions in China, declared that there had been a great awakening among his people during the past few years and that they were looking to America, rather than any other nation, for the development of their latent energies and immense natural resources.

J. O. G. Gibbons, formerly with Westinghouse, Church, Kerr & Co., and now engaged in private practice, has joined forces with C. E. Brown, who for the past few years has been a United States Ordinance engineer, forming a partnership under the name of Gibbons & Brown, consulting engineers, specializing in power plants and industrial problems, with offices in the Ordway Building, Newark, N. J.

C. E. Davies has been appointed managing editor of the *Journal* of the American Society of Mechanical Engineers, succeeding the late L. G. French.

Wilmer A. Dehuff, associate professor of civil engineering, Johns Hopkins University, Baltimore, has been appointed principal of the Baltimore Polytechnic Institute, to succeed Lieut. William R. King, who has been made dean. Mr. Dehuff is a graduate of the Polytechnic and Cornell and was formerly an instructor at the Baltimore institution.

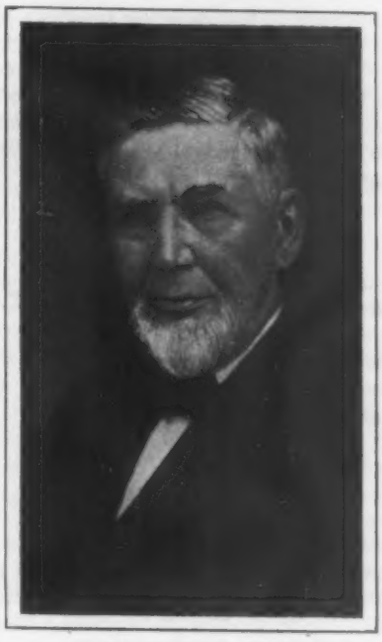
Archibald Read, secretary Bolckow, Vaughan & Co., Middlesbrough, England, who has been in the United States for several weeks, sails from New York on June 25.

Robert E. Belt, secretary and treasurer American Malleable Casting Association, and Addison Boren, manager works accounting bureau, Yale-Towne Mfg. Co., Stamford, Conn., have been appointed directors of the Industrial Cost Association to fill vacancies. The association maintains executive offices in the People's Bank Building, Pittsburgh. A Buffalo section of the Industrial Cost Association was formed in Buffalo on Wednesday, June 22, at the Old Colony Club, in the Iroquois Hotel, in that city.

OBITUARY

Joseph Sidney Seaman

JOSEPH S. SEAMAN, chairman of the board of directors, Pittsburgh Rolls Corporation, died at his home in the East End, Pittsburgh, on Wednesday, June 15. For a few years Mr. Seaman had been giving little time to active business owing to his failing health. He was born in Harmony, Butler Co., Pa., on April 14, 1839. After attending the public schools in Harmony he entered Conoquenessing Academy in Butler County, where he remained for only a short time. Upon the completion of his education, he accepted work in a brick yard, but a few months later, when only 17 years old, he went to Pittsburgh, having accumulated enough money, in his opinion, to make his way in the world. "I had exactly $7.25 in my pocl ets when I landed in Pittsburgh," Mr. Seaman related in telling about his early experiences. He wanted to become a carpenter, and for a year helped one of his brothers build cabins for river steamboats. Through Samuel Leonard, with whom he had become acquainted, young Seaman was given the opportunity to learn the roll turning trade and worked for four years in a shop in old Pipe Town, now Second Avenue, Pittsburgh. Having become an efficient roll turner, he accepted a position with the Pittsburgh Foundry, owned by Bowman & Garrison, which is now known as the A. Garrison Foundry Co. While employed by that company, he turned rolls for the first crucible steel made in Pittsburgh, and also turned many of the cannon used in the Civil War. At the outbreak of the war, Mr. Seaman attempted to join the Union army, but was told by the recruiting officers who had learned of his skill that his duty was to remain at his post in the foundry. He joined Knapp's battery, but this organization was not called into service. Some years after the war ended, he had an opportunity to buy many of the old iron cannon, which he purchased for scrap. When the cannon were delivered at Pittsburgh, he recognized one that he had turned out in the Pittsburgh foundry. He presented this cannon to the city of Pittsburgh, and it is now on exhibition in Arsenal Park in that City.



Joseph S. Seaman

He left the Pittsburgh Foundry to take charge of the shop of Hussey, Wells & Co., where he worked for three years. The Black Diamond Steel Works owned by Park Bros., engaged him to direct the work in the roll department and to build a number of new mills. In 1869, he took advantage of an opportunity to enter the foundry business with a number of associates. A small plant was erected at Liberty and Twenty-fifth Streets, and the company operated successively under the names of Bollman & Co.; Bollman, Boyd & Baggeley; Baggeley, Young & Co.; James B. Young & Co., and Seaman, Sleeth & Black. In 1885, the Seaman-Sleeth Co., was incorporated by Mr. Seaman and Robert Sleeth, who died some years ago. Mr. Seaman was not actively connected with the company for many years before his demise.

During the period that Mr. Seaman operated the Liberty Street plant, the late George Westinghouse was busily engaged developing the airbrake and a number of other mechanical devices. He conferred with Mr. Seaman and Mr. Baggeley many times, asking them for suggestions and advice. The first airbrake developed by Mr. Westinghouse was made in the Liberty Street foundry. Shortly after the airbrake had been introduced, the Westinghouse Air Brake Co. purchased the properties of the Seaman-Sleeth Co., which subsequently erected a plant, 80 x 80 ft. on Forty-second Street, near the Allegheny Valley Railroad, Pittsburgh, on the site of an old glass house. A partition divided the building into two sections of equal area; the foundry was located in one section and the remainder of the building was used for finishing work. The company has since extended the plant to a great extent, and has increased the capacity from about 10 tons to 50 tons a day.

Mr. Seaman was affectionately known to his friends as "Daddy." He was regarded as the patriarch of the American foundry industry, having been very active in the work of the American Foundrymen's Association since it was organized in Philadelphia in 1896. He was the oldest living past president of that organization. As a token of love and regard, his fellow-members of the American Foundrymen's Association presented him a hand-wrought silver pitcher and tray at the Chicago meeting in 1913. He was a member of the Pittsburgh Foundrymen's Association, the Duquesne Club, the Country Club, Pittsburgh Athletic Association of Pittsburgh, the Engineers' Society of Western Pennsylvania, the American Iron and Steel Institute, the Pittsburgh Chamber of Commerce and the United States Chamber of Commerce. He was president of the Pennsylvania National Bank and the Pennsylvania Savings Bank and chairman of the board of the Passavant Hospital, Pittsburgh.

Mr. Seaman was one of those to contribute $5,000 to the endowment fund established by the American Foundrymen's Association to reward definite achievements in the foundry industry, announcement of which was made at the annual convention in October, 1920.

FRANK A. TUPPER vice-president N. H. Buschman Corporation, iron and steel, 11 Broadway, New York, died at his home in Jersey City, N. J., June 12. He devoted practically his entire life to extending the scope of American products in the export field, first as pioneer export salesman of the old White Sewing Machine Co., then as sales representative of the New York & Java Trading Co., and after that for 15 years as export manager of the Page Steel & Wire Co. Since Feb. 1 Mr. Tupper was connected with the N. H. Buschman Corporation.

WILLIAM G. LECOUNT, manufacturer of machinists' tools, died at his home at South Norwalk, Conn., recently of apoplexy. He was born at East Norwalk, Conn., March 6, 1865. After attending the public schools he entered the employ of the Norwalk Iron Works Co. as an apprentice. After four years he became a high class machinist and joined his father who owned a machine shop where cribbage boards were made. When the cribbage business was sold William LeCount continued the manufacture of machinists' tools.

SCOTT H. TOLMAN, treasurer Tolman Mfg. Co., Boston, died last week in a Brookline hospital in his fifty-first year, after long illness. Early in life, while living in Maine, he became interested in metal novelties and later went to Boston, where he founded the business bearing his name.

EDWARD A. MORE, chairman of the board and founder of the More-Jones Brass & Metal Co., St. Louis, died suddenly of acute indigestion on June 16 at his country home near there. He was 72 years old, and was a native of Pennsylvania.

EDWARD H. PARKER, the Upson Walton Co. of New York, N. Y. died June 15.

NEW METAL SCHEDULE

Moderate Protection Is Provided for Iron and Steel Products

WASHINGTON, June 21. — While the lumber and chemical schedules of the permanent tariff bill still are sources of sharp controversy, and make introduction of the measure still a matter of uncertainty, it is known that the metal schedule has been entirely closed and is ready to be incorporated in the legislation. It is claimed that it is more scientifically arranged than the existing schedule in the Underwood-Simmons act of 1913. A great number of the classifications of the present law continue to be adhered to in the new schedule, but in numerous cases they have been changed to accord with new conditions of the metal industry that have developed since previous tariff legislation. This has been done in the face of difficulty experienced in getting valuable data due to the abnormal situation that has existed almost from the time of the enactment of the act of 1913, and especially since the outbreak of the war in 1914, but it is believed by the subcommittee that restoration of normal conditions will find that rates carried in the new schedule will prove to be on a satisfactory basis. To a large extent these rates are said to be approximately the same as those carried in the Underwood-Simmons act on heavier products and to be stated in specific instead of ad valorem terms, the latter being used generally in the Underwood-Simmons law. Proportionately higher rates are carried on the more finished products requiring considerable skilled labor.

Information from Abroad

The subcommittee framing the metal schedule has obtained some of the most important facts it has had to work on, and they were limited, from Americans who have made business trips to Europe. This information has shown plainly that of greatest importance to the iron and steel interests, so far as the tariff is concerned, is the great difference in the cost of labor in the United States and abroad which is much greater than it was prior to the war. As shown in the statistics recently published by the Committee on Ways and Means, this variance in wages is especially marked when comparison is made with those paid in Germany, and somewhat less in other countries which are strong competitors with iron and steel producers of the United States. Germany was a particularly vigorous competitor of the United States before the war in the iron and steel markets here and abroad and since the hostilities has much improved equipment for production, together with plenty of skilled labor. These factors, along with wages that are one-fourth and even less than one-eighth of those paid in the United States, when stated in terms of gold, place Germany in an unusually strong position to the disadvantage of American iron and steel makers. This has been taken into account in the metal schedule and caused it to increase existing rates.

Three Classes

With this as the groundwork, the subcommittee has divided the schedule into three classes for fixing the rates. Coming under the first are products that are manufactured principally by machinery, where labor, while a factor calling for much consideration, is comparatively of little importance as related to quantity and value. Iron and steel of the heavier kind have been embraced within this classification. It is stated that on this type of products higher duties than ever before needed because of the labor element, might have been justifiable, but increased rates are not provided. They have been cut down considerably under those of the Payne-Aldrich act. While this country previously had many labor saving machines that were not in use in foreign countries, the latter now have them and consequently the domestic industry has lost this advantage, so that articles of a further stage of manufacture have been transferred from the first to the second class, the labor cost being the dominating issue. Included in this list are such items as clocks, watches, and cutlery, requiring a great amount of skilled labor, and they have been given relatively high duties because it was thought necessary if the domestic interests in these lines were to be adequately protected from foreign competition. It is stated this class of products made in Germany now is being offered in the United States at figures much lower than the cost of domestic manufacture. Also included in this class are needles, steel wool, ball bearings and many others.

Infant Industries

So-called infant industries have been placed in the third class, and include such commodities as ferroalloys, surgical instruments, solid steel scissors, and tinsel thread and certain ores. These articles were those whose production either was started or developed during the war and as yet have not gained proportions sufficient to be maintained without protection. It is stated, however, that, while ferromanganese, ferrouranium, ferrosilicon, ferroaluminum, ferrocerium and ferrochrome are among the alloys that have been given protection, the rates will not prove sufficiently high to satisfy domestic makers. As an instance, it is stated that ferromanganese has been given the Payne-Aldrich duty of $2.50 per ton. Other products given duties are understood to include chrome, tungsten, vanadium, molybdenum and titanium. There is some doubt that manganese ore has been given protection in view of the report that the duty on ferromanganese is only $2.50. Nonferrous metals and ores whose production was on a large scale have been given somewhat higher protection than that afforded by the Underwood-Simmons bill, but less than the Payne-Aldrich act, it is said. Aluminum, aluminum scrap and alloys in which aluminum is the component material of chief value, in crude form are said to have been given a duty of 5c. per pound, compared with 7c. carried in the Payne-Aldrich act and 2c. in the Underwood-Simmons act. Aluminum plates, sheets, bars, strips and rods are said to have been given a duty of 9c. as compared with 11c. carried in the Payne-Aldrich act and 3½c. in the Underwood-Simmons law.

Delay in Reporting Bill

The principal difficulty in holding up the reporting of the permanent tariff bill is the sharp differences on the lumber and chemical schedules, though others are a source of difference in opinion. While some members of the Ways and Means Committee hope that the bill will be introduced within a few days, others think it will not be possible to have it ready before the first week in July, if then.

The fall national convention of the Society of Industrial Engineers will be held at Springfield, Mass., Oct. 5, 6 and 7. The main subject will be "Industrial Stability," covering production, distribution and sales, finance, accounting and personnel.

The annual picnic of the Purchasing Agents' Association of Pittsburgh was held Saturday, June 18, at the Pines. A feature was a ball game between the Pittsburgh Gage & Supply Co.'s and the R. D. Nuttall Co.'s teams.

Improvements which have been made to Claire blast furnace at Sharpsville, Pa., owned by Edmund W. Mudge & Co., Pittsburgh, have been completed. The stack is now rated at 600 tons. The company is preparing to install a gas washer.

Fitting the Cupola to Its Work

(*Continued from page* 1675)

ous and conditions too vacillating to admit of any fixed ratio. There are numerous reasons, practical and theoretical, which may be advanced to show that the melting ratio will vary with size of cupola and charging factors—that is: character of pig iron and scrap used and the quality of coke.

The larger the cupola the more relative penetration and driving necessary, hence some more coke will be burned per minute per unit area; if heavily sand coated sprues and foundry scrap be used it requires more heat to penetrate and fuse the iron, which is protected by sand coating, hence more coke will be burned; if the scrap be low silicon, high combined carbon, the melting point will be somewhat lowered, hence less coke will be needed; if high silicon, high graphitic carbon pig iron or scrap be used, the melting point will be raised, hence more coke will be necessary; if sand-cast pig iron be used, additional heat will be necessary to penetrate and fuse the sand coated metal; if steel scrap be used, the high melting point of this metal will require the absorption of more heat units, hence more coke will be needed.

The coke itself is a large factor. A coke of low density and high porosity burns faster, hence more coke will be consumed. These suggestions are not intended to convey the idea that additional coke has to be consumed to supply a more intense heat, but rather that the coke bed and intermediate charges burn away faster by reason of the metal remaining in zone of fusion longer, hence heavier replenishing is required to forestall oxidation of iron. Coke is the heat-supplying medium, therefore either "skimping" or overuse of fuel will certainly reflect deleterious effects on operations and resultant metal.

Intermediate coke charges should be even in weight and of sufficient quantity to replace or replenish that portion of bed which has been consumed at the region of the melting zone, regardless of quantity of metal melted. The prime objects of the intermediate fuel are to supply sufficient carbon for combustion to melt and superheat the metal charges which it precedes to the melting area, and to maintain a stable melting zone. Fusion is the result of conductivity of heat by the iron, therefore the more heat units absorbed by the metal in the melting process, the higher will be the tapping temperature of the iron.

Average foundry coke of sufficient hardness and structure, and containing 88 to 90 per cent carbon, will not ordinarily burn faster than 2 lb. per minute per sq. ft. of cupola area. Approximately 200 lb. of such coke is usually ample to melt one ton of metal, or maintain a melting ratio of 10 to 1 between charges of iron. However, the charging factors referred to should be borne in mind and due correction made accordingly for intermediate charges of fuel. Under certain charging conditions and gas-carbon ratio, the melting ratio may be as low as 8 to 1, thus necessitating the use of 250 lb. of coke per ton of metal charged. Such condition is likely to be due to abnormal operations, and should be corrected.

Reference to novel methods of intermediate coke charging may be of interest. Some melters charge the coke in convex form, or cone shaped, thereby forcing the metal charges around the wall of cupola. In this manner iron charges work their way down the sides below a coke-core center. According to the author's mode of reasoning, this is an irrational practice, because this condition permits the exposure of the bulk of metal at a point where free oxygen is most likely to occur.

Another novel feature of coke charging may be described as being the opposite—that is: intermediate coke is made concave in shape, or piled around the wall and depressed in the center, thereby forcing iron charges to the center or crater. Of the two methods, this would seem to be the more rational, by reason of the tendency of the coke to work its way down the sides, thus constituting a thick inner bed of incandescent coke through which any free oxygen would be forced to pass and combine with the carbon before reaching the metal.

However, the author has preferred to practice the leveling of intermediate charges, being careful to make them as compact as possible against the wall of cupola. Some melters also practice the spraying of water on coke to be charged, and even on coke in the cupola. The rationality of such procedure is inconceivable. Why unnecessarily draw on heat balance of the cupola to expel free moisture, and thereby minimize the opportunity of preheating the metal charges? If it should be assumed that the coke burns away too fast, then why not look into the quality of the coke, delivery of air and cupola conditions in general for remedial results, rather than practice an expedient?

Iron Melting Ratio

The melting zone may be considered, for practical purposes, to exist as a cylindrical-shaped area of 6 to 6½ in. in depth, through which the iron charge should pass within about 8 minutes to receive its final superheating and change from solid to liquid form. Therefore, on this basis there may be created a rational factor to compute metal weight charges, and such charges will be so gaged in size that there will not be a burning away of more than 6 to 6½ in. of coke, in any size cupola, before upper fuel charge shall have been released for replenishing bed.

In other words, by this method the range of intense superheating and melting zone equals the space occupied by the intermediate coke charge, and the melting ratio resolves itself into "how well the coke will melt iron," and not "how much iron the coke will melt." The factor 160, or 160 lb. of metal per sq. ft. of cupola area, will serve to compute metal weight charges; and approximate melting ratio of 10 to 1 will serve as factor to compute intermediate coke weight—or 1/10 of metal weight will constitute intermediate coke weight. The following data illustrate the theory:

In this manner a rational metal weight charge for each size cupola may be calculated; and with a fixed and definite melting zone, supported by proper size intermediate coke charge and adequate air volume, uniform and satisfactory melting conditions will prevail. Some melters presume that, by reason of the coke bed being large, it will support an "oversize" initial charge of iron. Such is not the case, and if such practice be indulged an excessive lowering of the coke bed may be expected before first intermediate coke charge arrives to replenish it.

It should, therefore, be borne in mind that each charge of metal should be of even weight; that steel, when used, should be charged first; followed by high silicon or gray iron; then low silicon, mottled or white iron on top. This charging method simply accommodates the melting point or eutectic of each metal—that is: the metals of highest fusion point are placed closest to higher temperatures.

It is the practice of false economy to exceed what

Time Consumed in Burning Coke Charge to Melt Iron

Cupola Diameter, In.	Cupola Area, Sq. Ft.		Lb. Coke Burned per Minute		Lb. Coke Burned		Coke Charge, Lb.		Lb. Burned per Minute		Total Time Minutes	Iron Charge, Lb.
24	3.14	×	2	=	6.28	÷	50	÷	6.28	=	7.96	500
44	10.52	×	2	=	21.04	÷	170	÷	21.04	=	8.07	1700
64	22.34	×	2	=	44.68	÷	355	÷	44.68	=	7.93	3550
90	44.18	×	2	=	88.36	÷	710	÷	88.36	=	8.03	7100

Space Occupied by Coke Charge

Cupola Diameter, In.	Area, Sq. ft.		Coke Bed Depth, Ft.		Coke Bed Cu. Ft.		Coke Weight Per Cu. Ft.		Total Bed, Lb.		Depth of Coke, In.		Coke Bed, Cwt.		100 Lb. Coke Occupies, In.		Coke Charge, Cwt.		Coke Charge Space, In.
24	3.14	×	2.833	=	8.90	×	30	=	267		34	÷	2.67	=	12.73	×	0.50	=	6.36
44	10.52	×	3.333	=	35.06	×	30	=	1052		40	÷	10.52	=	3.80	×	1.70	=	6.46
64	22.34	×	3.833	=	84.63	×	30	=	2539		46	÷	25.39	=	1.81	×	3.55	=	6.43
90	44.18	×	4.333	=	191.43	×	30	=	5743		52	÷	57.43	=	0.90	×	7.10	=	6.39

have been termed rational charges of iron or coke and air delivery, in an attempt to increase the output of a cupola above its rated or melting capacity. Such practice, if indulged in, will be at the expense of the quality of the metal. To attempt to increase the output of a cupola above reasonable rating by the use of extra coke, metal charges and rate of driving entails trouble. Should the melting of larger heats become necessary, it would be far more economical and satisfactory to install a second cupola of larger size, rather than overdrive a small cupola.

Cupola melting capacity is the net result obtained in pounds of metal melted per hour, after due correction shall have been made for cumulative varying conditions. That is: the burning of so much coke per unit area of cupola per hour being practically constant under normal working order, the coke ratio varies if the melting point of metals varies; it also varies if other charging factors vary. However, under fairly normal working conditions, approximately 1200 lb. of metal will be melted per hr. per sq. ft. of cupola area. Thus, a 36-in. cupola with 7.07 sq. ft. area will melt (7.07 x 1200) = 8484 lb., or 4.25 tons of iron per hour. These figures may be exceeded, or they may not be closely approached.

In either event, should there be a wide discrepancy, it would be well to check up closely on cupola conditions and operations.

Flux Ratio and Efficiency

Under fairly representative working conditions (melting sand-cast pig iron and unrattled or dirty scrap) there will be 80 to 125 lb. of acid and basic matter to each ton of metal charged which will enter the cupola slag, or an approximate average of 100 lb., of which 65 to 75 lb. will be acids. These slag materials consist of silica, alumina, metallic and non-metallic oxides, and other substances derived from coke ash, sand, furnace lining and limestone.

Reference to cupola charge balance sheet will give an idea as to the nature of the materials entering the slag, which contained 65.38 lb. of acids (silica and alumina), 47.07 lb. of bases (lime, metallic oxides and alkalies) and 0.98 lb. of sulphur. It required (0.98 x 1.25) = 1.23 lb. of lime to combine with the sulphur—leaving 45.84 lb. of bases to care for the 65.38 lb. of acids—or a ratio of 1.42 acids to 1 base.

According to blast furnace practice this would be considered an undesirable slag ratio; and the author believes that more limestone may be used to splendid advantage in the cupola to create a basic slag for the absorption and retention of excessive sulphur and harmful oxides. Therefore, figured according to blast furnace practice, and assuming a slag ratio of 1.1 bases to 1 acid, this quantity of stone could be safely used if care be taken to place the stone on coke charges as far as convenient from the walls of the cupola, so that the lime will not unduly attack the acid lining—especially at the melting zone.

Inasmuch as the manganous oxide (MnO), ferrous oxide (FeO) and alkalies (K_2O and Na_2O) are active bases, they may be chemically "summated" as calcium oxide (CaO) or lime, based on the fact that one molecule of a base containing one atom of oxygen is considered equivalent to the fluxing power of any other similar molecule—CaO and MgO. The fluxing power factor is the molecular weight of the oxide—CaO, 56; MgO, 40; FeO, 72; MnO, 71; K_2O, 94 and Na_2O, 62.

The limestone charges for the heat referred to could have been 105 lb. to the ton of metal, figured as follows:

	Acids	Bases	Sulphur
Coke	13.09	4.85	1.58
Metal	3.06	13.11	....
Sand	48.50	1.50	....
	64.65	19.46	1.58

Assumed slag ratio is 1.1 to 1; efficiency of stone is $\frac{100}{54} = 1.96$ and $\frac{40}{32} = 1.25$ lb. of lime required to combine with 1 lb. of sulphur to form calcium sulphide—hence:

64.65 x 1.1 = 71.12 lb. lime required for acids.
1.58 x 1.25 = 1.97 lb. lime required for sulphur.

73.09 lb. lime needed.
19.46 lb. bases supplied.

53.63 lb. available bases needed.
53.63 x 1.96 = 105.11 lb. stone needed.

Summated to actual lime equivalent, the ratio of acids and sulphur to bases would be:

$SiO_2 + Al_2O_3$	= 64.65 + 1.70 =	66.35
S	= 1.58	
CaO (stone)	=	57.62
MgO	=	0.19
FeO	= 12.82	
MnO	= 3.79	
CaO (coke)	= 1.35	
Alkalies	= 1.50	
CaO equivalent to MgO	= 0.19 x $\frac{56}{40}$ =	0.26
CaO equivalent to FeO	= 12.82 x $\frac{56}{72}$ =	10.00
CaO equivalent to MnO	= 3.79 x $\frac{56}{71}$ =	3.00
CaO equivalent to Alkalies	= 1.50 x $\frac{56}{94}$ =	0.89
CaO equivalent to CaO	= 58.97 x 1 =	58.97
	Summated lime = 59.23 +	13.89

Ratio summated lime to acids and sulphur:

$$\frac{59.23 + 13.89}{64.65 + 1.70 + 1.58} = 1.076$$

Therefore, the assumption is that approximately 105 lb. of limestone of the analysis in question to the ton of metal would have cared for the acids and all the sulphur in the coke, whereas the 50 lb. of stone used cared for only 0.98 lb. of sulphur in the coke. It would also probably have cared for some of the sulphur in the iron charged. Sulphur in coke is present chiefly as calcium sulphide (CaS). If there be present some sulphur in the form of iron pyrites (FeS) part of it may be volatilized, pass to the gases and be turned to SO_2. However, the residue, along with organic sulphur, passes either to the iron as FeS, or to the slag as CaS, according to the following formulas:

$$CaO + C + FeS = CaS + CO + Fe$$

If sulphur be in the form of gypsum:

$$CaSO_4 + 4C = CaS + 4CO$$

With high temperature at melting zone, and silica in slag low, the sulphur will have a tendency to seek combination with the slag rather than with the iron. With temperatures low and silica high, the reverse condition may be expected. Therefore, with the use of pig iron or scrap and coke carrying high percentages of sulphur it would be advisable to increase limestone charges per ton of metal, paying particular attention to the total acids in coke, metal and dirt which may find their way into the cupola. Sufficient slag should be carried in the cupola during a heat to take up the detrimental elements and oxides.

It would seem advisable to charge limestone on top of coke for the reason that, being underneath the iron, the release of its carbon dioxide gas will tend to add available heat units.

Air Volume Ratio Affects Temperatures

Adequate air volume is necessary for uniform and safe results, and the practice of so delivering it to a cupola should be strictly adhered to. Excessive air blown in a cupola has a tendency to create free oxygen, due to the fact that only a fixed quantity of oxygen can combine with a fixed quantity of carbon to form the gases. Any excess oxygen must be uncombined, or free; and such condition in the cupola not only creates free oxygen to oxidize the metal, but dilutes the gas and thereby lowers its temperature. An excess of 10 to 25 per cent air will lower the temperature of the gas flame from 250 to 550 deg. Fahr. An insufficient volume of air also has a tendency to ill effects by favoring the formation of carbon monoxide gas in the critical zones of the cupola.

If the previous charging ratios and factors be observed, then there may be evolved a rational free air delivery factor of 300 cu. ft. per minute for each sq. ft. of cupola area, and results will check closely with the generally observed approximate delivery of 30,000 cu. ft. of air per ton of iron melted, or 150 cu. ft. per lb. of coke (carbon) consumed. This factor would seem to be the maximum delivery to minimize oxidation and maintain maximum cupola gas flame temperatures,

as well as cause least disturbance to equilibrium of the reactions.

Table of Charging and Melting Data

The figures covering charging and operating data given below are intended as basal, due corrections to be made to conform with the varying conditions referred to, and calculated as follows: iron charging capacity, 160 lb. of metal per sq. ft. of cupola area; coke consumption, 120 lb. per hr. per sq. ft. of cupola area; air delivery, 300 cu. ft. per minute per sq. ft. of cupola area; and iron melted, 1200 lb. per sq. ft. of cupola area per hr. Total quantity of air cares for losses, etc.

Charging and Melting Data

Cupola Size, In.	Cupola Area, Sq. Ft.	Coke Burned, Lb. per Hour*	Air Blown, Cu. Ft. per Minute	Air Blown, Cu. Ft. per Hour	Iron Charges, Lb.	Iron Melted per Hour, Lb.	Iron Melted per Hour, Net Tons
24	3.14	377	942	56,500	500	3,770	1.88
26	3.68	442	1,104	66,240	600	4,420	2.21
28	4.26	511	1,276	76,650	700	5,110	2.55
30	4.90	588	1,470	88,200	800	5,880	2.99
32	5.55	666	1,665	99,990	900	6,666	3.34
34	6.21	745	1,861	111,660	1,000	7,450	3.73
36	7.07	848	2,120	127,200	1,150	8,480	4.24
38	7.89	947	2,366	142,000	1,250	9,470	4.73
40	8.70	1,044	2,610	156,600	1,400	10,440	5.22
42	9.62	1,154	2,885	173,100	1,550	11,540	5.77
44	10.52	1,262	3,165	189,900	1,700	12,620	6.31
46	11.54	1,385	3,460	207,600	1,850	13,850	6.92
48	12.56	1,507	3,770	226,200	2,000	15,070	7.53
50	13.59	1,621	4,075	244,500	2,200	16,210	8.10
52	14.92	1,790	4,475	268,500	2,400	17,900	8.95
54	15.90	1,908	4,770	286,200	2,550	19,080	9.54
56	17.05	2,046	5,115	306,900	2,700	20,460	10.23
58	18.32	2,198	5,500	330,000	2,900	21,980	10.99
60	19.63	2,356	5,900	354,000	3,150	23,560	11.78
64	22.34	2,681	6,700	402,000	3,575	26,810	13.40
66	23.75	2,850	7,125	427,500	3,800	28,500	14.25
68	25.22	3,026	7,565	453,800	4,050	30,260	15.13
72	28.27	3,392	8,500	510,000	4,500	33,920	16.96
78	33.18	3,982	9,950	597,240	5,300	39,820	19.91
80	34.02	4,082	10,206	612,360	5,450	40,820	20.41
84	38.46	4,615	11,538	692,280	6,150	46,150	23.07
90	44.18	5,302	13,254	795,240	7,100	53,029	26.51

*At 120 lb. per sq. ft. area per hour.

Fabricated Steel Business in May

The amount of fabricated steel business that was contracted for in May, according to the records of the Bridge Builders and Structural Society, was 50,800 tons, or 5000 tons less than in April. The percentage of shop capacity corresponding is 28 against 31 per cent for April. The five months of 1921 has totaled about 4 per cent above the amount of business done in the first five months of 1919, but in May of 1919 the volume of business was twice that of April of that year and the following months recorded round tonnage totals as business sprang up after the cessation following the signing of the armistice. The average of the eight months since September, 1920, is 44,800 tons against a capacity of the bridge and structural shops of the country of 180,000 tons per month.

Research Fellowships in Mining and Metallurgy

In co-operation with the United States Bureau of Mines and the State Mining Experiment Station, the School of Mines and Metallurgy of the University of Missouri (Rolla, Mo.) offers four fellowships to graduates who have the equivalent of a Bachelor of Science degree and have had the proper training in mining, metallurgy, or chemistry and are qualified to undertake research work. The income of each fellowship is $800 per annum for the twelve months beginning July 1. For 1921-22 the four fellowships will be granted in mining, ore dressing, physical metallurgy (heat treatment of steel) and electrometallurgy (zinc). Applications to the Director, School of Mines and Metallurgy, with a certified copy of collegiate record, statement of professional experience, and names and addresses of three references will be received up to September 1.

Preparation of Malleable Castings for Motor Use

Useful information in the preparation of malleable iron castings for use in mechanical engineering and particularly motor work is contained in an article in *Auto-Technik*, Oct. 23, 1920. As abstracted by *Technical Review*, London, the author, after briefly discussing the properties of malleable iron, proceeds to describe the methods adopted in Germany for making the castings. For small and thinner castings the cupola furnace is used and for larger and thicker castings or for very high quality material, reverberatory and open-hearth furnaces. In Germany the reverberatory furnaces take the form of small drum-shaped furnaces heated by tar-oil. The advantages of the various types are discussed.

The raw material used is a burden consisting of low-phosphorus pig iron, wrought iron or steel scrap, with certain discard material added. Foreign brands of pig are now being replaced by the special pig obtained from the Kupferhütte Duisburg.

The raw cast iron must have a perfectly white fracture and must not exhibit segregations of graphite. The silicon content should be sufficiently high to prevent graphite segregation and to promote the malleablizing process. Manganese and sulphur make the tempering process difficult. The percentage of sulphur, however, depends very largely on the smelting process adopted. The carbon content should obviously be kept low.

The chemical composition in general is closely related to the process of melting adopted. The table shows a good average composition.

Average Composition of Untreated Malleable Iron

Furnace	Per Cent Silicon	Carbon	Mangan.	Phosphor.	Sulphur
Cupola	0.8–0.6	3.5–3.2	0.15–0.3	0.08–0.1	0.18–0.26
Crucible	0.8–0.6	3.0–2.8	0.15–0.3	0.08–0.1	0.08–0.15
Reverberatory.	1.0–0.5	3.0–2.6	0.15–0.3	0.08–0.1	0.06–0.10
Open-hearth...	1.0–0.5	2.8–2.5	0.15–0.3	0.08–0.1	0.05–0.08

The tempering or heating period depends on the thickness and chemical composition of the castings, being more rapid with a high silicon and low carbon and sulphur contents. The tempering material added to the cast iron pots used for treating the castings is generally hematite or forge scalings in the German method. After leaving the pots on treatment, the castings are treated in special drums to remove the tempering ore, after which they are "rectified." The writer discusses at some length the precautions necessary in dealing with the initial (gray iron) castings to prevent cracking and breaking on treatment and gives a few illustrations showing how these defects and blow-holes, piping, etc., may be avoided. In conclusion, some space is devoted to the question of the mechanical properties and microstructure of malleable iron castings.

Preventive for Acid Vapors in Pickling

A compound which is said to prevent acid vapors in the pickling of steel has been developed by the Hoffman Process Co., Pittsburgh. The compound is claimed to have a tendency to create a heavy, thick, white foam, which retains the acid fumes within the bath; also to exert an inhibitive effect in retarding the action of the acid on the metal being pickled, once the scale is removed.

Further advantages enumerated are prevention of loss of acid through vapors, damages to buildings, machinery and injury to the health of workmen.

At the annual dinner of the Washington section of the American Society of Mechanical Engineers held in Washington, on June 10, plans for the organization of an engineers' club, to include engineering and allied technical societies in the District of Columbia, were outlined. Building the larger organization around some existing society, possibly the Washington Society of Engineers, was suggested. Scientific bodies, as well as engineering bodies, probably will be included in the organizaton.

BAR IRON AND OTHER SCALES

Failure to Agree on Basis of the Sliding Adjustment

YOUNGSTOWN, OHIO, June 21.—Failure of representatives of the Amalgamated Association of Iron, Steel and Tin Workers, meeting with manufacturers at Atlantic City, to reach an agreement on the bar iron wage scale for boilers and muck mill hands, and on the sheet and tin mill scale, may result in suspension of affected units. As yet no call has been issued for another conference. Both contracts expire June 30, though in the case of the bar iron agreement provision is made for the automatic operation of the old scale for a period of 30 days, in event of failure to reach a new agreement.

The conferees met at the Hotel Marlborough-Blenheim in Atlantic City, about twenty employers being represented at each conference. There were 24 representatives present for the Amalgamated association, including the officers, M. F. Tighe, president, and Fred H. Keightley, secretary-treasurer. The conference to negotiate a new bar iron contract preceded the sessions to agree upon a scale for the sheet and tin mills. H. C. Rockhill, vice-president and general manager of the Fort Wayne Rolling Mill Co., Ft. Wayne, Ind., presided over the first conference, while A. N. Flora, vice-president Trumbull Steel Co., Warren, Ohio, was the presiding officer over the second.

At the conclusion of the gatherings, the manufacturers and the men still differed over many details of the proposed new scales and working conditions. The acceleration of operations by certain important sheet producing groups indicates that employers anticipate a possible shutdown of the mills after June 30, through a failure to reach a basis of agreement with the men.

Institution of the 6-hr. day in the sheet and tin divisions of the steel industry was one of the changes suggested by the men, but was not pressed. It was discussed, however, and was deemed impracticable by the manufacturers.

It is likely that a complete suspension of manufacturing would not cause much disturbance or consternation at this time, among either the manufacturers or the employees, on account of the current low state of operations.

The Different Bar Iron Scales

In the conference on the bar iron scale, manufacturers virtually asked for restoration of the 1915-1916 contract, which would involve a reduction for bar mill workers of $1.87 per ton above a 1.50c. base. Representatives of the Amalgamated, on the other hand, agreed to accept the 1920-21 scale and footnotes without any change. Employers contend that costs of production were advanced during the war and that tonnage rates paid the men were increased. Now, in view of reduced business and lower living costs, they ask the elimination of these advances.

The difference between the past year's scale and that of 1915-1916 is on the rate of advance from and including the 1.30c. base. The rate of increase from 1c. to 1.29c. is 10 cents on each .05c. advance in the selling price. At 1.30c. the tonnage rates jumps 83 cents and at 1.50c. it advances $1.35 per ton. The natural increase in the tonnage rate, under the 1915-1916 agreement, at 1.50c., would be 20 cents.

Manufacturers claim these increases, granted under the stress of war conditions, make the cost of puddling iron $1.87 a ton more than it should be on a regularly graduated scale.

The current tonnage rate of $13.76 per ton for puddlers compares with the base of $5.50, and is therefore 150 per cent above base. In guide mills, employees are now paid a rate which is 87 per cent above the base.

Ask Elimination of Extra Sheet Mill Man

Disagreement over the contract to govern the sheet mill situation arose principally over working conditions. There was no change on the base of the sheet mill scale. Employers asked for the elimination of an extra man on sheet mill crews, added during the war. This demand was made on the plea of the necessity of reducing production costs. The manufacturers agreed to place the rougher and catcher on the same basis. During the war the catcher was advanced on the ground that his work was harder and the position was therefore entitled to more pay. The difference on most mills will be slight.

During the May-June period, sheet workers are paid a rate which is 54 per cent above the base.

Ask for Former Tin Mill Rate Increase

A more serious disagreement arose in the conference on the tin mill scale, owing to the demand of the manufacturers that the increase in the tonnage rate be 1 per cent for each 5c. advance in the selling price of tin plate above the base of $3.50 per 100-lb. box of prime plates. Last year, the employers agreed to an advance in the rate of increase from 1 per cent to 1⅛ per cent and now ask a restoration of the old rate of increase. This the employees oppose.

Some manufacturers suggested the elimination of an extra man on tin mill crews, granted during the war, but this demand was not pressed. Manufacturers, however, ask that the crews do certain extra work, chiefly polishing rolls, without charge.

Tin mill employees are now paid a rate which is 65½ per cent above the base.

Last year bar iron workers were given a flat 15 per cent increase in the base rate and an additional advance of 15 per cent on the boiling rate per ton of 2240 lb., based on a 1.50c. card and above. This advance applied to muck and puddle mills, bar and 12-in. mills, to busheling on cinder bottom, busheling on sand bottom, knobbling, heating slabs and shingling. For workers in guide, 10-in. hoop and cotton mills, a 10 per cent advance at a 1.50c. card was agreed upon, and then an additional 5 per cent increase on all sizes below base sizes until they reached 5/16-in. rounds and sizes taking similar rates, when there was another 10 per cent advance.

At the conferences this year, the Amalgamated association made no attempt to change the memorandum of agreement embodied in the contracts, setting forth general principles. Last year the conference agreed upon wages and working conditions, but split when the unions proposed a change in the memorandum of agreement, which manufacturers claimed would have compelled them to recognize any new unions that might be formed in any branch of the industry, and which they vigorously opposed. At adjourned conferences, the Amalgamated association agreed to the retention of the old memorandum.

Tools from Dismantled Shipyards

SEATTLE, June 14.—While there has been a steady increasing call for lathes, drill presses and welding outfits in the city and country, jobbers report difficulty in closing prospects due to the persistent marketing of second hand machinery and tools from the dismantled shipyards. Jobbers now fear that, because of the community demand for lower taxes in the school levy and the consequent rapid curtailment of expenditures, the bulk of $1,000,000 appropriated by the high and vocational schools of the State for machinery and tools will go to the second hand dealers.

The plant of the General Motors Corporation in St. Louis is not for sale. This is the answer to the St. Louis Chamber of Commerce by C. S. Mott, vice-president of the corporation at Detroit, to reports that had reached St. Louis that the plant there was to be dismantled and eliminated from all its future manufacturing plans.

The Armco Association of the American Rolling Mill Co., Middletown, Ohio, has purchased the Mathes-Sohngen Building on South Main Street, Middletown, for a club house. The building is a two-story brick structure and will be remodeled to suit the needs of the association.

Machinery Markets and News of the Works

JUNE A POOR MONTH

Machine-Tool Business Still Lagging in All Markets

Railroad Buying at Chicago, Expected Last Week, Did Not Materialize—Other Tool Users Waiting

Sales of machine tools so far this month have been exceptionally light, and June will probably go on record as the poorest month of the year.

Railroad buying at Chicago by the Illinois Central and Rock Island, which was expected last week, did not materialize. In common with other users of tools, the railroads appear to be waiting for "something to happen."

In some markets there is at times a fair volume of inquiry, which comes in spurts. Few of these inquiries are resulting in orders, but occasionally there is something which looks promising. For example, a Cleveland company has quoted on several inquiries from Detroit aggregating 35 milling machines, and there is a fair prospect of this business being closed.

Cleveland reports indications of greater activity. Durant Motors, Inc., is expected to come into the market soon for equipping its assembling plant at Lansing, Mich., and the former Cadillac plant in Detroit, which it recently took over. One inquiry in the Cleveland market calls for 16 tools.

Cincinnati has received a few orders. Two heavy duty engine lathes and several shapers for New York vocational schools went to builders in that city and also a Standard Oil Co. order for six machines, totaling $25,000.

The Ford interests at Detroit have purchased a 90-in. driving wheel lathe for its railroad shops at Toledo.

A little more activity in New England is noted. The General Electric Co., Lynn, bought eight tool room lathes and there were other small purchases.

The New York market continues dull. There is an inquiry for 14 tools from a machinery dealer at York, Pa. The New York Board of Education took bids June 20 for 15 to 20 tools.

New York

NEW YORK, June 21.

The past week has brought no change in the local machine-tool market. Orders and inquiries are scarce. June so far has not shown much promise and the month will probably go on record as one of the poorest of the year.

Bids were received up to June 20 by the Board of Education, school district of New York, on about 15 to 20 machine tools, the list including a large quantity of supplies for vocational schools.

Another inquiry comes from a machinery dealer at York, Pa., and calls for six automatics and eight chucking machines.

The Navy Department received bids up to June 17 on three 10-in. lathes with 5-ft. beds.

The extreme dullness in the crane market continues without interruption. The only inquiry of any consequence reported is from the Porcupine Co., Bridgeport, Conn., for a short list of cranes. Among recent sales is a 5-ton, 33-ft. 8-in. span, electric hoist, purchased by James L. Carey, engineer for the Hummell-Ross Fibre Co., Hopewell, Va., from the Brown Hoisting Machinery Co.

The New York Central Railroad Co., Grand Central Terminal, New York, is taking bids for the erection of additions to its shops at Solvay, N. Y., to include a new engine house, boiler works and other buildings.

The Cox-Kleimin Aircraft Corporation, Amityville, L. I., has been incorporated with a capital of $100,000 by C. L. and V. Cox, and A. Kleimin, to manufacture airplanes and parts. It is represented by Hovell, McChesney & Clarkson, 50 Court Street, Brooklyn.

The Ribbon Steel Products Corporation, Brooklyn, has been incorporated with a capital of $50,000 by C. W. Reynolds, C. W. Lockwood and R. Rae, to manufacture iron and steel specialties. J. P. Bromell, 17 East Forty-second Street, New York, represents the company.

The Parker Supply Co., 785 East 135th Street, New York, manufacturer of sheet metal punches, screws and kindred products, has been reorganized and operations placed under the direction of the J. G. White Management Corporation, 43 Exchange Place. The same line of manufacture will be continued. Walter Rautenstrauch has been elected president, and D. L. Boyd, secretary and general manager.

The John Jergensen Co., New York, has been incorporated with an active capital of $50,000 by John Jergensen, M. F. Sticht and H. A. Kapit, to manufacture electrical appliances and equipment. The company is represented by Sapinsky & Amster, 276 Fifth Avenue.

The Aqua Electric Heater Co., New York, has filed notice of organization under Connecticut laws, with capital of $200,000, to manufacture electric heaters and kindred products. H. Bobker, 250 West Fifty-fourth Street, represents the company.

L. Barth & Son, Inc., 32 Cooper Square, New York, manufacturer of hotel equipment, has arranged for the manufacture of a line of electrical kitchen products including bake ovens, ranges, toasters, etc., and in the future will devote a portion of its plant at Kingston, N. Y., to this branch of production. The electrical department will be in charge of R. B. Basham.

The Beacon Tire Co., River Street, Beacon, N. Y., has awarded a contract to Amos Jones, 45 North Street, for a three-story addition, 50 x 80 ft., to cost about $25,000.

The Empire Steel Partition Co., Brooklyn, recently incorporated with a capital of $50,000, will operate a plant at College Point, L. I., for the manufacture of hollow steel partitions for office and other service. The company has been organized with W. C. Lange as president and H. W. Charmley, secretary and treasurer. W. L. Carns, 128 Broadway, New York, is representative.

The Multiple Storage Battery Co., 104 West Fifty-second Street, New York, has been incorporated under Delaware laws with capital of $150,000 to manufacture electric storage batteries, with plant on Van Wyck Avenue.

L. H. Redner, 200 West Seventy-first Street, New York, is having plans prepared by C. B. Meyers, architect, 31 Union Square, for a new two-story automobile service and repair works at 327 West Sixty-ninth Street to cost about $90,000.

The Louis Greenberg Plumbing Supplies Co., New York, has been incorporated with a capital of $500,000 by Louis, H., and S. Greenberg, to manufacture pipe, plumbing fixtures and equipment. S. Kahn, 61 Park Row, represents ahe company.

The Self-Sealing Auto Tube Co., Brooklyn, has been incorporated in Delaware with a capital of $850,000 by Monroe A. Behrend, Hector C. Adams and Howard A. Sperry, 236 Berkeley Place, to manufacture automobile tubes and other rubber products.

The Ashland Contracting Co., Brooklyn, has taken a 50-year lease of property on Fulton Street, between New York Avenue and Paulins Street, Jamaica, L. I., 118 x 634 ft., at an aggregate rental of $1,500,000, for the establishment of a new industrial center. Plans are being prepared for a cold storage plant; coal pockets, with coal handling equipment;

distributing warehouse, with material loading and unloading equipment; and a number of buildings for light manufacturing. The different structures with equipment are estimated to cost about $1,250,000.

J. Beaumann & Co., New York, have been organized by J. Beaumann and P. J. Leahon, 334 Fifth Avenue, to manufacture wire products.

The Crane Co., 490 Cherry Street, New York, manufacturer of pipe, fittings, steam specialties, etc., with headquarters at Chicago, has filed plans for a new one-story building at 503 Cherry Street, 100 x 145 ft., to cost about $27,000.

The New York Edison Co., 130 East Fifteenth Street, New York, has filed plans for the construction of a one-story power house, 24 x 60 ft., at 38 Bowery, to cost about $130,000 with equipment.

The Signal Wick Co., Plainfield, N. J., has been incorporated with a capital of $50,000 by Harry L. Freeborn, Hugh T. Goodwin and Thomas E. Krinzman, 131 West Front Street, to manufacture railroad signal specialties and other kindred equipment.

The Florence Pipe Foundry & Machine Co., Florence, N. J., has had revised plans prepared for its new one-story machine shop, 60 x 250 ft., and will take bids for construction early in July. C. L. Reeves is superintendent.

Fire, June 14, destroyed a portion of the automobile and truck body plant of the Penn Motors Corporation, Riverton, N. J., with loss estimated at about $40,000. Headquarters of the company are at 1714 North Broad Street, Philadelphia.

The Industrial Motor Truck Co., West New York, N. J., has been incorporated with a capital of $100,000 by Ragna Johnson, Albert J. Manetti and J. V. Waldy, 159 Seventeenth Street, to manufacture automobile trucks and parts.

The B. & S. Mfg. Products Corporation, Jersey City, N. J., has been incorporated with a capital of $1,000,000 by Richard W. Braden, Charles Stern and Harry Martin, 73 Brinkerhoff Street, to manufacture machinery and parts.

The Thomas Brown Co., Hoboken, N. J., has been incorporated with a capital of $45,000 by E. Lambert, Byron Abrahams and Thomas Brown, 1618 Willow Avenue, to manufacture electrical appliances and equipment.

The Aero Mfg. Co., Newark, has been incorporated with a capital of $250,000 by Victor W. Fitch, Ernest O. Dick and Lloyd G. Beatty, 142 Market Street, to manufacture aeroplanes and parts

The Superior Auto Radiator Works, 11 Sixteenth Avenue, Newark, has filed notice of organization to manufacture automobile radiators. Michael Silverman, 379 Morris Avenue, heads the company.

The Auto Gear & Axle Corporation, Newark, has been incorporated with a capital of $50,000 by Edmund Van Buren, Abraham Weisinger and Robert Kerber, 262 Halsey Street, to manufacture axles and gears for automobile service.

The Decker Mfg. Co., 251 Elm Street, Newark, has filed notice of organization to manufacture blow torches and kindred products. Edward L. Decker, 540 Muriel Street, Elizabeth, N. J., heads the company.

New England

BOSTON, June 20.

Business booked the past week came from interests outside as well as in New England. The General Electric Co., Lynn, Mass., purchased six 10-in. and two 14-in. tool room lathes, and the Ford Motor Co. closed on a 90-in. driving wheel lathe for its railroad machine shop, delivery to be made at Toledo. A Pittsburg, Tex., manufacturer of crates bought machine shop equipment, including a large milling machine; the Crescent Motor Co., Clayton, N. Y., combination grinding and buffing equipment; the S. K. F. ball bearing interests, two internal grinding machines, and the Buckeye Rubber Products Co., Willoughby, Ohio, three 11-in. x 6 ft. Blount lathes. A representative of a Western made drilling machine has sold a number of tools in New England, northern New York and New Jersey to be shipped later in the year at to-day's prices. This case is an exception.

An occasional sale of a single tool, usually a lathe, grinder or press, constitutes the extent of the market. Makers' lists remain unchanged but it is seldom a tool purchased brings full price, buyers invariably being able to secure concessions, which, when competition from used equipment dealers is keen, has run as high as 25 and 10 per cent discount. Instances are cited where the manufacturer has secured full list prices, but has thrown in numerous accessories, or practically the same thing as a concession. A tendency among tool makers is to sacrifice profits for the sake of reducing inventories, or for keeping together already greatly reduced plant organizations. New England railroads show little interest in machine tools and some find it cheaper to have car repair work done by outside shops. For instance, the New York, New Haven & Hartford Railroad will have 1000 cars repaired by a Cape Cod car builder. The locomotive repair shops of the Boston & Albany Railroad at West Springfield, Mass., are closed once more, throwing 400 out of work. The car shops will be operated with a full force, however.

The number of motor driven tool room lathes involved in the two Manchester, N. H., school inquiries, has increased to approximately 30 and all the leading machine and tool houses are bidding. Bids have been received at Washington on 19 precision bench lathes for the Newport Torpedo Station, Newport, R. I. Contrary to reports these are not motor driven. Bids will be opened this week at the torpedo station on two 12-in. geared head lathes, two small sensitive drills, a special 41-in. vertical boring mill and two electric tools. A Syracuse, N. Y. automobile interest is inquiring for internal grinding machine equipment for cylinder work.

New England machine tool plant activity is at the lowest point recorded in many years. In Springfield, Mass., it is reported there are 19,500 machinists out of employment. In Worcester unemployment in the machinists' trade amounts to about half that number, while in Hartford County, Conn., it is more than half.

The machine shop and annealing department of the J. D. Crosby Co., Pawtucket, R. I., were damaged by fire, but resumption of operations is expected by the end of the current week or the beginning of next.

The Fallon Machinery Co., Lynn, Mass., tools and dies, has purchased the Zina Goodell property, Salem, Mass., and hereafter will operate under the name of the Zina Goodell Corporation in Salem, plans calling for the relinquishment of the Lynn factory. An executive office will be maintained there, however. Oliver W. Goodell, 167 Lafayette Street, Salem, is president; Harry H. Steinle, 55 Humphrey Street, Swampscott, vice-president, and Edward R. Fallon, 95 Monument Avenue, Swampscott, treasurer. Machinery, parts, dies, hardware, hardware specialties, etc., will be manufactured.

The Production Engineering Corporation, Boston, mechical engineer, formerly with offices at 6 Beacon Street and plant at 64 Pearl Street, has acquired the equipment and lease of the P. & G. Tool Co., 40 Sudbury Street, the property of Gale-Sawyer Co. interests, and has moved its offices to that location. It makes tools and dies and does general machine work, in addition to manufacturing the Bantam line of vacuum cleaners and electric-gas brazing torches. C. O. Deveau is president; H. L. Vaughn treasurer, and J. H. Ayer, consulting engineer. Critchley reamers, formerly made by the P. & G. Tool Co., are now manufactured by the Gale-Sawyer Co., South Weymouth, Mass.

A Massachusetts charter has been granted the Industrial Lock-Nut Co., Worcester, with an authorized and issued capital of $250,000. Napoleon R. Thibert, 2 Heard Street, is president, and George P. Newton, 380 Burncoat Street, treasurer.

The Atlantic Coast Power Co., Boston, capitalized for $500,000, has been granted a Massachusetts charter to manufacture marine and other machinery under the so-called Hemmenway patents. No president is named in the incorporation papers. George H. Glasscock, 143 Massachusetts Avenue, is treasurer.

The New Onlee Headlight Controller Co., Holyoke, has taken out a Massachusetts charter with Daniel F. Moriarty, 1154 Hampden Street, Holyoke, president, and Frank A. Champlin, East Longmeadow, treasurer. The capitalization is $30,000. The original Onlee Headlight Controller Co. some time ago was petitioned into bankruptcy.

The Cook-Taylor Co., Inc., Fall River, Mass., and Providence, R. I., a going concern with a capital of $50,000, has taken a Massachusetts charter to manufacture band-tying gages and textile machine devices. Albert Cook, 185 Pleasant Street, Holyoke, Mass., is president; Ralph E. Taylor, 316 Bank Street, Fall River, vice-president, and Edward F. Cook, 36 Bliffin Street, Fall River, treasurer.

Fire last week in the plant of the Ansonia Foundry Co., Ansonia, Conn., brass castings, caused damage estimated at $10,000. Operations will resume as soon as the loss is adjusted.

The plant of the New England Steel Castings Co., Shaker Road, East Longmeadow, Mass., was destroyed by fire last week with an estimated loss of $100,000. Among the machinery destroyed was a large crane. It has not yet been decided whether the plant will be rebuilt. Hiram Meadows is president, and Carl Carpenter general superintendent.

E. C. Hibbard, Boston, has filed plans for a new one-

story shop at 15 B Street, for the manufacture of metal products, estimated to cost about $20,000.

The Dawn Mfg. Co., Bridgeport, Conn., has been incorporated with a capital of $50,000 by J. A. Dickerman, G. Leckis and H. V. Leckis, 93 Oakland Street, Stratford, Conn., to manufacture electrical appliances and equipment.

The Johnson Auto Body Corporation, Boston, has been incorporated with a capital of $300,000 to manufacture automobile and truck bodies. Henry C. Johnson, 336 Metropolitan Avenue, is president and treasurer; H. A. Johnson and C. E. Wheeler are directors.

The Porcupine Co., Wordin Avenue, Bridgeport, Conn., manufacturer of steam boilers, structural steel and iron products, etc., will soon break ground for its new plant on the Boston Post Road, Fairfield, Conn., to be one-story, 125 x 320 ft. Fletcher-Thompson, Inc., Bridgeport, are architects and engineers.

Prest-O-Electric Devices, Inc., Hartford, Conn., has been incorporated with a capital of $500,000 to manufacture electrical and mechanical products. R. K. Thistle, 25 Baldwin Street, East Orange, N. J., represents the company.

C. L. Pratt and C. W. Sayce, Boston, formerly connected with the Boston Gear Works, have acquired the plant and business of the Union Gear & Machine Co., and in the future will operate this organization.

The New England Oil Refining Co., Peat Street, Fall River, Mass., has filed plans for the erection of a new oil separator building at its plant to cost about $50,000, with other extensions to cost $36,000.

The New England Power Co., 35 Harvard Street, Worcester, Mass., has arranged for a bond issue of $1,000,000, the proceeds to be used in part for the construction of its new hydroelectric generating plant on the Deerfield River, near Searsburg, Vt., estimated to cost, complete, a like amount.

Charles H. Harris, Inc., Norwalk, Conn., has been incorporated with a capital of $500,000 to manufacture automobile windshields and similar products. It recently awarded a contract for a plant on Main Street, one-story, 100 x 200 ft., and estimated to cost about $75,000. Charles H. Harris, Ponus Avenue, Norwalk, is president. Offices are maintained at 136 West Twenty-fourth Street, New York.

The Adell Mfg. Co., Orange, Mass., has been incorporated with a capital of $90,000 by John A. Adell and Carl C. Harris, Orange; and William A. Davenport, Greenfield, Mass., to manufacture iron and steel products.

Buffalo

BUFFALO, June 20.

The Houde Engineering Corporation, 1392 West Avenue, Buffalo, manufacturer of automobile shock absorbers and similar products, has plans under way for the erection of a new two-story factory, 37 x 100 ft., to cost about $20,000. G. W. Wolf, 1377 Main Street, is architect. A. B. Shultz is president.

The Johnson Motor Service Corporation, Buffalo, has been incorporated with a capital of $150,000 by H. F. Johnson, P. J. Snyder and E. W. Studt, to manufacture automobile parts and equipment. It is represented by Moot, Sprague, Brownell & Marcy, Erie County Bank Building.

The Buffalo Aircraft Corporation, Buffalo, has perfected plans for the establishment of a new aircraft school on property at South Buffalo recently acquired. Shops will be provided for instruction in the assembling of airplane motors, repair and parts manufacture, as well as the construction and repair of fuselage and wings, etc. Elmer P. Morris is business manager.

The Rochester Gas & Electric Corporation, Rochester, N. Y., is planning for extensions to its power plant and system to cost about $1,500,000. A bond issue is being arranged.

The Meldrum-Gabrielson Corporation, Syracuse, N. Y., is arranging for the early erection of its new works, plans for which are nearing completion. It is estimated to cost about $300,000 and will be devoted to the manufacture of special machinery and tools, a feature of production to be a milling machine, recently patented.

The Wiggler Corporation, Buffalo, has been incorporated with a capital of $50,000 to manufacture automobile signal devices. Brendel, Bagot, and Magoffin, 804 Mutual Life Building, represent the company.

The Seneca Battery Corporation, Niagara Falls, N. Y., has filed a certificate of incorporation to manufacture storage batteries. Peter F. Frey, 2225 Thirteenth Street, Niagara Falls, is the principal stockholder.

The Binghamton Railway Co., Binghamton, N. Y., advises that the item published in the June 9 issue of THE IRON AGE that it would build an electric power house at Endicott, N. Y., is incorrect. The only construction work in progress or contemplated at present is a high tension line connecting with a sub-station at Endicott. This work is practically completed.

Chicago

CHICAGO, June 20.

The Illinois Central and the Rock Island railroads have not yet taken action on their lists but are expected to do so at any time. June sales by local machine-tool dealers have been exceptionally light, and unless there is a turn for the better the month will be the poorest thus far this year. The scarcity of orders is such that business which would pass unnoticed in normal times stands out prominently. A sale of this character was made to the Rockford Steel Equipment Co., Rockford, Ill., recently organized to manufacture metal fixtures and to handle miscellaneous sheet metal work. The equipment bought included a squaring shear, a drill press, an emery grinder, two brakes, an electric drill, vises and miscellaneous tools, amounting to about $1,500. Prices of standard types of machine tools remain unchanged, but a few reductions of a miscellaneous character have been announced recently. The Van Dorn Electric Tool Co., Cleveland, and the Wodack Electric Tool Corporation, Chicago, have reduced electric drills 10 per cent. The Dreis & Krump Mfg. Co., Chicago, has marked down bending brakes 10 per cent; the Atlas Press Co., Kalamazoo, Mich., has reduced arbor presses 10 per cent; and the Universal Boring Machine Co., Hudson, Mass., has cut horizontal boring machines 20 per cent.

The Fairbanks Co., 701 West Washington Street, Chicago, emphatically denies the recently circulated report that it would discontinue the sale of machine tools. No such action is contemplated in Chicago or in any of the other offices of the company.

The Ahlbell Battery Container Corporation has been organized with $20,000 capital stock by James E. Broyles, Howard R. Fuller and John M. Walgren. It has secured an option on a plant at 315 East Thirty-third Street, Chicago, where it expects to manufacture battery containers. For the present work is being sublet to another company. Information may be secured from Loreno Bello, telephone, Douglas 5000.

The Atlantic Brass Works, 1325-1337 West Lake Street, Chicago, heretofore a partnership, has been incorporated by Isidor Chaplik, Louis Silverberg and Herman E. Grossman. It will continue to manufacture brass and iron castings.

Koog & Dryfelt are building a shop at 1111 South Crawford Avenue, Chicago, for the construction and repair of wagons. Stillwegen & Co., 1538 Clybourn Avenue, have the contract for the building which will cost $4,500.

G. A. Koester, 741 Perry Street, Davenport, Iowa, has let a contract for a three-story garage, 64 x 150 ft., on Grady Street between Front and Second Streets at a cost of $150,000.

The Advance Forging & Tool Works, Inc., 527 Law Avenue, Chicago, will soon start work on a drop forge shop, 100 x 125 ft. Equipment will include 12 steam hammers. A die shop, 75 x 100 ft. will also be constructed.

The Acme X-Ray Co., 223 West Madison Street, Chicago, has been incorporated with a capital of $150,000 by Frederick Kull, Julius J. Grobe and John Lawris, to manufacture X-ray equipment and devices.

The Montana Refining Co., Billings, Mont., has completed plans and will break ground at an early date for the erection of its new oil refinery estimated to cost about $125,000. R. Molt is president.

The Western Pipe & Steel Co., Room 7, 154 West Randolph Street, Chicago, has been incorporated with a capital of $100,000 by Frederick T. Hoyt, Reuben W. Newton and John R. Lenfesty, to manufacture steel pipe, and other iron and steel products.

The Peerless Safety Can & Device Mfg. Co., 129 South Green Street, Chicago, has been incorporated with a capital of $150,000 by Richard Abram, Robert White and B. F. Allnutt, to manufacture automotive equipment, metal cans, etc.

The Board of Education, City Hall, Minneapolis, Minn., has arranged for a one-story addition to its manual training shop at Eighteenth Avenue and North Fremont Street, to be equipped for gas engine construction and repair.

Detroit

DETROIT, June 20.

The Board of Education, Battle Creek, Mich., will install a machine shop, forge shop, metal-working and other mechanical departments in the new three-story vocational and manual training school to be erected at an estimated cost of about $400,000. A power plant will also be built. John D. Chubb, 109 North Dearborn Street, Chicago, is architect. L. H. Sabin is president of the board.

The Ver Linden Division of the Durant Motors, Inc., Lansing, Mich., has established temporary offices on the site of the new local assembling plant, and work on the main unit has been placed under way. Edward Ver Linden will arrange for the purchase of shop equipment and machinery for the new assembling plant, and will supervise the installation. It is planned to have a portion of the works in operation by November, with complete cars manufactured by the first of the year.

The Atlas Tractor Co., Adrian, Mich., is reported to be arranging for the erection of its proposed new tractor manufacturing plant at Belleville, Mich., instead of Adrian, as originally projected. The Adrian site, upon which preliminary foundation work has been done, will be abandoned, it is said.

The Detroit Washing Machine Corporation, Detroit, has been incorporated with a capital of $500,000 by Anthony B. Eggert, A. and Roy J. Corrigan, 58 Glendale Avenue, to manufacture electrically operated dish-washing machines, parts, etc.

The Delta Chemical Co., Wells, Mich., is planning to rebuild its power house, partially destroyed by fire, June 13, with loss of about $40,000.

The Richards Punch & Die Corporation, Detroit, has been organized with $200,000 capitalization by Otis K., Clement C. and Clarence A. Richard, 2983 East Grand Boulevard, Detroit. It will manufacture punches, dies, punch and die retainers, jigs, fixtures, etc., but does not contemplate building at present.

The Stafford Appliance Co., recently incorporated at Benton Harbor, Mich., with a capitalization of $50,000, will manufacture tools for garage work. Later it will go into the manufacture of automobile accessories. The company will occupy a leased building. Herbert A. Thomas is president.

The Purity Stamping Co., Battle Creek, Mich., will soon start work on a two-story factory. W. T. Hulcher is president.

The Office Metal Furniture Co., Grand Rapids, Mich., has taken out a permit for a $50,000 factory to be erected immediately.

Philadelphia

PHILADELPHIA, June 20.

The Bureau of Water, Department of Public Works, Philadelphia, has filed plans for its proposed new one-story machine shop and repair works at Twenty-ninth and Cambria streets, to be 160 x 200 ft., and estimated to cost close to $150,000 with equipment. C. E. Davis is director.

The Stelwagon Mfg. Co., Nineteenth and Washington streets, Philadelphia, manufacturer of roofing products, has acquired property at 4714-16 Market Street, adjoining land previously purchased, to be used for a new works. No official announcement has been made regarding proposed construction.

The Universal Metal Bed Co., 172 North Tenth Street, Brooklyn, has leased the building at 36 North Second Street, Philadelphia, for a new local establishment.

The Hutchinson Baking Co., 3240 Walnut Street, Philadelphia, has filed plans for a one-story extension to its machine and repair shop.

The Philadelphia Machine Screw Works, Philadelphia, is being organized by Albert L. Barbier and Luther S. Kauffman, Mutual Life Building, to manufacture machine screw products and other metal specialties. Application for a State charter will be made on July 5.

The Swartz Mfg. Co., Philadelphia, has been organized to manufacture furnaces and kindred products. R. Swartz, 5026 Kingsessing Avenue, heads the company.

W. V. Panghorne & Co., 1927 West Montgomery Street, Philadelphia, electrical contractors, are taking bids up to June 28 for an addition to their construction and repair shop.

The Miller-Steiner Rubber Co., Trenton, N. J., recently incorporated with a capital of $100,000, has taken over the former plant of the Olden Rubber Co., 678-94 North Olden Avenue, for the establishment of works to manufacture mechanical rubber products. A number of alterations and improvements will be made. It is expected to have the plant ready for operation in July. John M. Miller is president and general manager; Julius B. Steiner and George W. Page are directors in the company.

The Regal Spring Bed Co., Philadelphia, is being organized by Benjamin Dickman, Joseph Rash and Maurice E. Levick, Land Title Building, to manufacture bed springs, cots, etc. Application for a State charter will be made on July 11.

Williams & Friedman, Harrisburg, Pa., are having plans prepared for the construction of a new two-story automobile service and repair building, 80 x 125 ft., to cost about $60,000. C. Howard Lloyd, Telegraph Building, is architect.

Pittsburgh

PITTSBURGH, June 20.

This market is practically bare of inquiry, only a few cranes and a little other business in small equipment coming out. The Bradford Brick & Tile Co., Bradford, Pa., was figuring on two 3-motor, 2-ton cranes, but has decided to postpone buying. The Thomas Flexible Coupler Co., Dunkirk, N. Y., was also figuring on an electric hoist, but has put off buying until conditions are more certain. There are other numerous examples of postponed buying, partly in the belief that prices will be lower and also because buyers have decided to wait until the business situation is more settled. The LaBelle Iron Works, Steubenville, Ohio, will probably need considerable equipment for its extensions, but no inquiry has yet come out. The American Bridge Co., Pittsburgh, has an inquiry out for two 10-ft. bending rolls for bending ¾-in. plates, this equipment being for export.

The Pittsburgh Crane & Equipment Co., Pittsburgh, received an order from the Sharpsville Boiler Works Co., Sharpsville, Pa., for a 12-ton bull tower riveting crane, 21-ft. span, 57-ft. lift.

Most of the electrical equipment for the new rolling mills being built by the International Nickel Co., Huntington, W. Va., has been placed. The Allis-Chalmers Mfg. Co., Milwaukee, through its Pittsburgh office, was given the contract for the motors and controllers for the 30-in. sheet mill, also for the cold mill and the 24-in., 20-in., 14-in. and 9-in. merchant mills. The Westinghouse Electric & Mfg. Co., East Pittsburgh, was awarded the contract for a variable speed set to drive the 9-in. and 10-in. merchant mills. The General Electric Co. received the contract for the transformers, motor generator set and main switch board of the Truck type, which is made exclusively by the General Electric Co. Several contracts for small motors and other miscellaneous electrical equipment are yet to be placed.

The Brown & Zortman Machinery Co., Pittsburgh, has sold a 2-in. pipe cutting and threading machine for shipment to Scottdale, Pa.

The American Steel Band Co., Pittsburgh, has acquired 12 building lots on Twenty-third Street, Sharpsburg, to be used for plant operations. No official announcement has been made regarding buildings to be erected.

Fire, June 15, destroyed a portion of the plant of the Penn Wheelbarrow Co., 4741 Kansas Street, Pittsburgh, with loss estimated at $50,000, including machinery.

The North Pole Ice Co., Pittsburgh, has filed plans for a new ice-manufacturing plant at 1218 West Carson Street, Southside, to cost about $60,000.

The Reliance Boiler Works, Pittsburgh, is being organized by William Oleon, H. C. Feldstein, and Raymond M. Collins, to manufacture steam boilers, tanks, stacks and other steel plate and iron products. Application for a State charter will be made on July 18. David Turets, 501 Bakewell Building, represents the company.

The Oliver Iron & Steel Co., Tenth and Muriel streets, Pittsburgh, has awarded a contract to Pihl & Miller, Wabash Building, for its new four-story addition, 60 x 120 ft., brick and steel, to cost about $125,000. Contract has also been let to D. T. Riffle, 1006 Forbes Street, for the construction of a new power house to cost about $60,000.

W. W. Martin, 5847 Center Avenue, Pittsburgh, has completed plans for a three-story automobile service and machine repair works at South Hiland Street and the Pennsylvania Railroad, 100 x 160 ft., to cost about $100,000.

The Mullens Auto & Electric Repair Co., Mullens, W. Va., recently organized, has plans under way for the erection of works, 40 x 90 ft., for machine and electrical repair operations. W. J. Beverage is secretary and treasurer.

The Monongah Glass Co., Fairmont, W. Va., is planning for the installation of a new gas producer plant, with coal-handling and other labor-saving equipment. R. T. Cunningham is secretary.

The Fairmont Carriage & Automobile Works, Fairmont, W. Va., is planning to rebuild the portion of its plant recently destroyed by fire with loss estimated at about $70,000, including equipment.

Cincinnati

CINCINNATI, June 20.

Several local manufacturers of machine tools report the receipt of a number of orders the past week. A vocational school being established in New York bought machines, including two heavy duty engine lathes and several shapers. The Standard Oil Co. bought six machines costing approximately $25,000. Two other lathe manufacturers received fair-sized orders and a manufacturer of milling machines and grinders also booked several tools. All this business came from outside the railroad field. One local railroad shop, after catching up with engine repair work, has laid off approximately 65 men, but these are expected to be taken on again in the course of the next two weeks. An inquiry from South America for several machines has been received and it is confidently expected that a local manufacturer will get the business.

The J. G. Frelinger Iron Works Co., West Second Street, Cincinnati, has been incorporated with a capitalization of $30,000. Plans for the future include a new shop for its manufacturing department, but nothing definite has been decided upon.

The Kant-Score Piston Co., Buffalo, N. Y., has purchased the former plant of the Queen City Brass & Iron Works, Cincinnati, from the D. T. Williams Valve Co., which it will occupy. It will operate a foundry and machine shop for the manufacture of automobile pistons and work is expected to begin shortly after the first of July. Part of the machinery now installed in the plant at Buffalo will be moved to Cincinnati and additional purchases will be made. John Eckerle is president of the company and will be located at 5 West Third Street until the new plant is completed.

Fire on June 9 destroyed a building of the H. T. Hance Foundry Co., Westerville, Ohio, containing the novelty, vending machine and gummed tape departments. The loss is estimated at $25,000.

Indiana

INDIANAPOLIS, June 20.

The Tri-State Motor Corporation, Evansville, Ind., is having plans prepared for a three-story service building and repair works, 65 x 130 ft., at First and Locust streets, estimated to cost about $75,000. Shopbell & Co., Furniture Building, are architects.

The Grimm Auto Co., Richmond, Ind., has plans under way for a two-story and basement service and repair building, 70 x 104 ft. C. E. Werkling & Son, Palladium Building, are architects.

The Triangle Steel Products Co., Michigan City, Ind., recently organized, is perfecting plans for the establishment of a local plant to manufacture tools, automobile parts and kindred equipment. It is proposed to have the works ready for service in about 60 days. The company is capitalized at $150,000 and headed by H. C. Jostes and L. J. Finske, Michigan City.

The T. W. Warner Co. and the Warner Corporation, Muncie, Ind., have become affiliated with the Durant Motors, Inc., 1764 Broadway, New York, and will furnish transmission and steering gears for the automobiles to be manufactured by the Durant organization. The companies will be operated independently. T. W. Warner, head of the concerns, has become vice-president of the Durant company. He has recently resigned as head of the Muncie Products Division of the General Motors Corporation.

The Carbon Hill Coal Co., Terre Haute, Ind., is planning for the erection of a new machine shop and forge works at its recently acquired properties at Rosedale, Ind. A new steel tipple and power plant for general operations will also be constructed.

Baltimore

BALTIMORE, June 20.

The Simmons Co., Kenosha, Wis., manufacturer of brass beds, springs, etc., will soon take bids for the erection of its new two-story building on Porter Street, Baltimore, 120 x 182 ft.

The Davis Coal & Coke Co., Continental Building, Baltimore, is planning for the construction of two new tipples at its coal properties at Thomas, W. Va. About $200,000 will be expended for the installation, with other improvements. A. W. Galloway is president.

The Consolidated Accessories Mfg. Co., Frederick, Md., has been incorporated with a capital of $50,000 to manufacture tanks and other metal products. H. N. Schofield is president and H. E. Rubottom secretary and treasurer; both of Frederick.

The Star Motor Co., Frederick, Md., is planning for the erection of a new one-story building, 90 x 400 ft., a large part of which will be equipped as a machine shop and metal works.

The McCabe Co., Norfolk, Va., has been incorporated with a capital of $50,000 to manufacture automatic water heaters and other heating equipment. Allen McCabe is president and treasurer, and W. L. Ewing vice-president and general manager.

The Tru-Matic Tube & Sales Co., Wilmington, Del., has been incorporated with a capital of $500,000 by M. B. Hawkins, T. F. Magarity and John G. Gray, Ford Building, to manufacture automobile tubes and other rubber products.

The Iron City Stove & Foundry Co., Bristol, Va., recently reorganized with a capital of $40,000, has plans under way for extensions and the installation of new equipment. E. H. Wilkinson, president, is in charge.

James E. Rector, 8 Technical Building, Asheville, N. C., head of Rector, Blackstock & Taylor, is planning for the installation of new equipment at the plant of the Asheville Shale Brick Co., Asheville, recently acquired under lease. The improvement will include drying apparatus, engine, belting, etc. The output will be increased to about 25,000 bricks per day.

The Darco Corporation, Wilmington, Del., a subsidiary of the Atlas Powder Co., Wilmington, has arranged for a stock issue of $1,500,000, the proceeds to be used for the erection of a new refining plant in Louisiana, for the manufacture of carbon products.

M. L. Himmel & Son, 107 North Frederick Street, Baltimore, manufacturers of office furniture, etc., have acquired a plant at Calverton Road and Hollins Lane which will be remodeled for manufacturing.

The United States Shipping Board, Washington, will build an electric power plant at Crande Island, near Norfolk, Va., to be used in connection with a new fuel oil storage plant at this location. An electrically operated pumping plant will also be constructed.

The Clifton Auto Painting & Top Co., 1711 North Spring Street, Baltimore, has been incorporated with a capital of $100,000 by C. Merritt and Charles R. Twilley, and C. Gordon Seigmund, to manufacture automobile tops and other automotive equipment.

Fire, June 15, destroyed the plant of the Harris Hardware Co., Roanoke, Va., manufacturer of builders' and other hardware, with loss estimated at about $140,000, including equipment.

The Roanoke River Development Co., Mutual Building, Richmond, Va., has been granted permission to build a new hydroelectric generating plant on the Roanoke River, near Boydton, Va. It will be designed for an initial capacity of 50,000-hp.

Cleveland

CLEVELAND, June 20.

There are indications of more activity in the machinery market in the Michigan territory. Some business is in prospect from new companies in the automotive field and others that are planning extensions, but no buying is expected by automobile interests with large, well equipped plants. One manufacturer of milling machinery the past week quoted on several Detroit inquiries aggregating 35 machines. Machine tool manufacturers and dealers have been unable to secure any definite information on the requirements of the Durant Motors, Inc., but it is expected that this company will be in the market shortly for equipment for an assembling plant to be built in Lansing and for fitting out the former Cadillac plant which it will take over in Detroit. Locally, sales continue very light, being limited to single machines, with the exception of one order for four machines, taken by a Cleveland dealer for a Michigan plant.

Manufacturers and dealers are getting a fair volume of inquiries, but a very small proportion is resulting in orders. Prospective purchasers in most cases are holding out until conditions improve. One inquiry has come out for 16 machines and dealers are inclined to believe that this business will be placed. Some orders for single automatic machines are coming from textile and metal bed manufacturers.

Used machinery is moving slowly and buyers are insisting on very low prices. Local dealers are finding it difficult to move the machinery of a Cleveland plant, consisting of a slightly used high-grade tool room equipment which is being offered at 33 1-3 per cent reduction from the present manufacturer's prices, the prospective purchasers claiming that these prices are too high.

The Brown Hoisting Machinery Co., Cleveland, has taken a Government order for a 5-ton unloading plant for coal and manganese ore, to be installed at Mobile, Ala.

The Glauber Brass Mfg. Co., Cleveland, has purchased the

former works of the National Malleable Castings Co., Platt Avenue, and will remove to this plant which will be equipped for the manufacture of plumbers' brass goods.

N. K. Bowman and G. A. Dillon are interested in a company which plans to erect a factory at Bowdil, near Massillon, for the manufacture of coal mining tools.

The Adrian Brass & Aluminum Castings Co., Adrian, Mich., is planning the erection of a machine shop.

The Sterling Brass Co., 4610 St. Clair Avenue, Cleveland, will take bids at once for a two-story brass foundry and machine shop, 140 x 200 ft., at St. Catherine and Ninety-third streets, and estimated to cost about $100,000 with machinery. Allen Sogg, 319 Hippodrome Building, is architect and engineer.

The H. B. Young Motor Truck Co., Euclid, Ohio, has acquired a factory at Geneva, Ohio, for the establishment of a new plant to manufacture motor trucks and parts. The Geneva Chamber of Commerce is interested in the project.

Milwaukee

MILWAUKEE, June 20.

Machine-tool builders are marking time with the expectation that the passing of midyear will develop some fair-sized requirements which have been held in abeyance for some time past. Business so far in June has been quiet and dull, the demand being more restricted than probably at any time since the first half of 1913. Sales have been of such small volume and of such a scattering nature that it would be difficult to point to any one line of metal-working industry which is the best buyer. Some export inquiry is passing, but so far actual orders have been negligible.

The Koehring Corporation, 3100 Concordia Avenue, Milwaukee, manufacturer of concrete mixers, paving outfits and contractors' power equipment, has acquired the entire business of the Jaeschke Brothers Foundry Co., 3036 Locust Street, Milwaukee, taking possession June 15. The owners of the Koehring company have been financially interested in the Jaeschke works for several years. It is unofficially stated that the present transaction involves a consideration of approximately $250,000. It does not, however, involve any important changes in the executive or administrative departments, which will both be kept intact. Besides furnishing the Koehring company with its supply of gray iron castings, the Jaeschke works supply castings commercially, and it is intended to continue this department under the new control. William J. Koehring is president and general manager, and Philip A. Koehring, secretary and treasurer, of the Koehring Corporation.

The American Grinder Mfg. Co., Milwaukee, manufacturer of portable tool grinders, abrasives, etc., has leased the entire second floor of the Milwaukee Terminal Building at Broadway, Erie Street and Milwaukee River, and will move its offices and works to the new location July 1. At present the main works occupy the substructure of the gymnasium of Marquette University at Sixteenth and Clybourn streets. A branch shop also is operated at 718 Poplar Street, while some light production operations are conducted at 2203 Sycamore Street, where the offices are located. The lease of the Terminal Building provides about 45,000 sq. ft. The department established some time ago to manufacture wrenches and tool sets for automotive shops, private and public garages, will go on a 24-hr. working schedule July 1 in the new quarters to meet demands. E. J. Archambault is president and treasurer, and L. E. Bertane, vice-president and secretary.

The Hollister Auto Co., Oshkosh, Wis., has awarded contracts for a new garage and service building, 80 x 122 ft., two stories and part basement, estimated to cost $40,000 equipped. The general contractor is C. R. Meyer & Sons Co., Oshkosh.

The Farmers Tractor Co., Oshkosh, Wis., which recently accepted the offer of business men of Stevens Point, Wis., to relocate its works and offices, is having plans prepared for a machine and assembling shop. Details and estimates of cost are not yet available.

The Midland Tractor Co., Milwaukee, has been incorporated to manufacture tractors, trucks and similar commodities. The capital stock consists of $250,000 of preferred stock and 600 shares of common stock without par value. The incorporators are P. B. Brueckebauer, Arthur Wickham and Howard T. Foulkes, attorneys, 500 Sentinel Building, Milwaukee. No statement concerning plans is available at this time.

The Oconomowoc, Wis., Board of Education will take bids after July 1 for a new high school and vocational training institute, two stories and basement, 122 x 189 ft., of brick and concrete. The architects are Parkinson & Dockendorff, La Crosse, Wis. E. K. White is secretary.

The Natinal Blow Pipe & Ventilating Co., Milwaukee, has moved into its new plant and offices at 489-493 Eleventh Street, which provide an increase of about 50 per cent in its facilities for manufacturing shaving and dust collecting systems, ventilating devices and general sheet metal work.

The Seamweld Equipment Co., Milwauke, has been organized to manufacture electric and other welding machines, electrodes and other materials, devices and supplies. The capital stock consists of $50,000 of preferred stock and 1000 shares of common stock without par value. The incorporators include Harry W. Marsh, president and general manager Marsh Refrigerator Car & Service Co.; Peter C. McNulty, Jr., vice-president National Utilities Corporation, and Joseph W. Fay, mechanical engineer, 715 Farwell Avenue, Milwaukee.

The Milwaukee-Western Fuel Co., 120 Wisconsin Street, Milwaukee, will close bids June 24 for the construction of a brick, steel and concrete garage and service building, to cost about $85,000, at Clinton and South Pierce streets, to serve its docking equipment and motor trucks. It will be 125 x 200 ft., part two stories and basement, and was designed by Kulg & Smith, consulting engineers, Mack Block, Milwaukee.

The Board of Education, Mayville, Wis., has engaged Parkinson & Dockendorff, architects, La Crosse, Wis., to design a new high school containing a complete manual arts department the cost not to exceed $200,000. Alvin Dreger is secretary of the board. Bids probably will be taken shortly after July 15.

California

LOS ANGELES, June 14.

The Union Oil Co., Union Oil Building, Los Angeles, has completed plans for the erection of a new three-story building in the Wilmington district to cost about $300,000.

The Pasadena Gas Appliance Co., 722 East Colorado Street, Pasadena, Cal., has filed notice of organization to manufacture gas-burning devices, appliances, etc. F. H. Ohrmund, 1465 Orange Grove Avenue, heads the company.

The Albany Engineering Works, 2161 Shattuck Avenue, Berkeley, Cal., will make extensions in its plant and install new machine shop and foundry equipment. H. T. Coburn is head.

The Pruden-Burr Steel Building Co., Los Angeles, manufacturer of portable steel buildings, has opened offices at 228 Douglas Building, and is selecting a local site for a new plant. The buildings are formed of pressed galvanized steel panels, and equipment for handling work of this character will be provided.

The Western States Gas & Electric Co., San Francisco, has made application for permission to build an addition to its hydroelectric power plant on the South Fork of the American River and for enlargement of the generating plant of its subsidiary, the El Dorado River Co., on the South Fork of the Feather River. The extensions will provide about 156,000 hp. and are estimated to cost in excess of $1,000,000.

The Hobbs Storage Battery Corporation, Los Angeles, has been incorporated with a capital of $250,000 by H. F. Prince, J. C. Niven and S. M. Haskins, to manufacture electric storage batteries. The company is represented by Gibson, Dunn & Crutcher, Los Angeles.

In addition to its proposed new plant at Sacramento, Cal., estimated to cost about $5,000,000, the United States Electric Steel Products Co., Inc., San Francisco, is negotiating with the Chamber of Commerce at Vallejo, Cal., for a suitable site for the establishment of a branch works in this section, to be operated in conjunction with the main Sacramento plant.

The Vibrated Cement Products Co., Fresno, Cal., recently organized, will establish a local plant for the manufacture of cement specialties. Howard S. Duff, Bruce E. Blake and Stanley Moffatt, Fresno, head the company.

The Gulf States

BIRMINGHAM, June 20.

E. T. Beatty, 1 South Twentieth Street, Birmingham, has awarded a contract to Joseph T. Ryerson & Son, Chicago, for the erection of his new machine shop, one-story, 66 x 100 ft., and estimated to cost close to $50,000 including machinery. Ground will be broken at once.

The Alabama Power Co., Birmingham, has arranged for a bond issue of $2,500,000, a portion of the proceeds to be used for extensions and improvements in electric plants and system. Thomas W. Martin is president.

L. B. Boyd, Miami, Fla., is organizing a company to establish a plant for the manufacture of cement blocks and kindred specialties. It will be two-story, 50 x 60 ft., with initial equipment installation estimated to cost about $20,000.

The Red Genii Mfg. Co., El Paso, Tex., has been incorporated with a capital of $1,050,000 by W. A. Riley, O. C.

Youngblood and R. K. Simons, El Paso, to manufacture combustion equipment for automotive service.

The Trinity Motor Co., Good and Florence streets, Dallas, Tex., has awarded a contract to the Inge Construction Co., Dallas, for a one-story addition to its machine and repair works, estimated to cost about $30,000.

William Wendtland, Shiner, Tex., is organizing a company to establish a local plant for the manufacture of plows and other agricultural equipment. Details are being arranged.

The City Council, Plant City, Fla., is arranging for a bond issue of $150,000, the proceeds to be used for the erection of a new municipal electric power and ice-manufacturing plant.

The Birmingham Auto Body Co., Birmingham, manufacturer of automobile bodies, has leased a two-story brick building to be erected on a local site, 50 x 140 ft., for the establishment of a new automobile body manufacturing works.

Henry Ford, Detroit, is reported to be negotiating for the purhcase of three large buildings at the Government nitrate works at Sheffield, Ala., to be used as a local plant for the manufacture of Ford automobiles and Fordson tractors.

The Miami Electric Light & Power Co., Miami, Fla., is planning for extensions in its power plant to cost about $275,000, including new boilers, generating machinery and other operating equipment. Plans are being prepared for the construction of a new one-story machine and meter repair shop. H. H. Hyman is general manager.

Walter J. Lloyd and associates, Stuart, Fla., are organizing a company for the establishment of a local plant for the manufacture of fertilizer products, estimated to cost about $300,000 with machinery. M. J. Polson, Stuart, will be in charge of construction and equipment installation.

The Central South

ST. LOUIS, June 20.

The W. K. Knutson Co., Wichita Falls, Tex., has plans under way for the erection of a new plant in the vicinity of Henryetta, Okla., to manufacture vacuum refrigerators and similar metal products.

The Board of Public Works, Chillicothe, Mo., has completed plans for the erection of a new municipal electric power plant. E. E. Harper, 3031 Park Avenue, Kansas City, Mo., is engineer. C. F. Adams is president of the board.

The Chicago, Rock Island & Pacific Railroad Co., 137 West Van Buren Street, Chicago, has completed plans for a new one-story car repair shop at Trenton, Mo., 85 x 400 ft., estimated to cost about $60,000 with equipment.

The Oneta Refining Co., Oneta, Okla., has plans under way for its new oil refinery at Pine Bluff, Ark., to have an initial daily output of about 1000 bbl. and estimated to cost about $300,000 with machinery.

The Southland Coal Co., Henderson, Ky., is planning to rebuild its tipple and engine plant, recently destroyed by fire with loss estimated at about $75,000.

S. A. Lane, Little Rock, Ark., and associates are organizing a new company to build an oil refinery in the vicinity of Helena, Ark. The Helena Chamber of Commerce is interested in the project.

The Arkansas Royalty Co., El Dorado, Ark., recently organized with a capital of $100,000, has preliminary plans under way for the erection of a new oil refinery. Lee Miles is president, and E. E. King, secretary and treasurer.

The Bunn Vending Machine Co., Dyersburg, Tenn., recently incorporated, has acquired a local building for its proposed plant to manufacture vending machines, and equipment will be installed at an early date. A. A. Kirk is president; J. M. Bunn, vice-president, and H. R. Meriweather, treasurer and general manager.

The Common Council, Cookeville, Tenn., has disposed of a bond issue of $100,000, the proceeds to be used for the construction of a municipal hydroelectric power plant. Plans are being prepared.

The Louisville & Nashville Railroad Co., Louisville, has awarded contract to the Joseph E. Nelson Co., 3240 South Michigan Avenue, Chicago, for the construction of its new engine house and shops at Hazard, Ky., estimated to cost in excess of $150,000.

The Battery Service Co., Muskogee, Okla., recently organized to manufacture electric storage batteries, has plans under way for a new one-story plant, 110 x 170 ft., estimated to cost about $30,000. J. H. Schmidt is president and manager.

The Model Machine Works, Little Rock, Ark., 401 Rector Avenue, is in the market for cylinder grinding, piston turning and other machine shop equipment.

Canada

TORONTO, June 20.

Quietness continues in the machine-tool market. The past week has brought forth but a very limited demand for new equipment, but sales of used machines are fairly steady. Small tools are more active and some increase in sales was reported.

Warren Brothers, East London, Ont., are preparing to erect a machine shop at a cost of $25,000 and will shortly be in the market for equipment.

The Toronto Asphalt Roofing Mfg. Co., Ltd., which is erecting a new factory at Mount Denis, Toronto, states that it expects to install machinery about the end of June. A complete line of roofing material including slate, roll, etc., will be turned out.

The Walker Twist Drill & Tool Co., Ltd., Walkerville, Ont., has purchased the plant, equipment and stock, as well as all unfilled orders of the Welt Twist Drill Co. of Canada. The new owners are now operating the plant, making a standard line of drills, reamers, cutters, and special tools in carbon and high speed steels.

Edwin J. Robertson, Walker House, Toronto, is in the market for 60 36-in. or 24-in. gage industrial cars, steel deck preferred; six tons of 16 or 20-lb. relaying rails; six 36-in. or 24-in. gage switches; fish plates, bolts, etc.

The Canadian Johns-Manville Co., Ltd., 450 St. James Street, Montreal, has plans and will receive bids, no closing date, for general and steel contracts for two factories at Asbestos, Que.

Gascon & Parant, architects, 502 St. Catharine Street East, Montreal, Que., are preparing plans for a three-story garage and service building, 60 x 120 ft. Equipment will be required.

The Town Council, Camrose, Alta., contemplates additions and repairs to the power house at a cost of $20,000. Some new equipment will be installed.

The Town Council, Peace River, Alta., contemplates the construction of electric lighting plant and system.

The foundry owned by the Desjardins Foundry Co., St. Andre, Que., was recently destroyed by fire with loss to building, machinery, etc., of $100,000.

Crucible Steel Co. of America Cuts Dividend

At a meeting of the board of directors of the Crucible Steel Co. of America at New York, June 16, a dividend of 1 per cent on the common stock was declared, payable July 31, this being a reduction for this quarter of 1 per cent. H. S. Wilkinson, chairman of Crucible company, in a letter to the stockholders said:

"It is believed that the bottom has been reached in the business depression and that the country's consumption is now considerably in excess of current production. However, on account of the slow reduction of the surplus stocks that were accumulated during the war, the new business now being placed is not in such volume as will yield sufficient profit to warrant the continuance at this time of dividends at the rate heretofore paid.

"The financial condition of your company is excellent. Our large building program has been completed and paid for. It has been the aim of your directors to reduce all current obligations, and every effort has been made in this direction. All commitments for materials outstanding at the commencement of the depression have been satisfactorily met, and all financial obligations promptly liquidated as they have become due. The result is that within nine months a net reduction has been made of more than $8,000,000 in the company's outstanding obligations as of Aug. 31, 1920, and at the present time the company has more than enough cash and receivables to meet all current liabilities. It is the expectation of your directors that by the end of the fiscal year (Aug. 31, 1921) the company will have liquidated its accounts and bills payable. In addition to this, your company will be well fortified with an inventory of $25,000,000 of available raw materials and manufactured products."

Receiver for Sligo Iron & Steel Co.

The court at Pittsburgh last week appointed the Yough Trust Co., Connellsville, receiver for the Sligo Iron & Steel Co., New York, with a plant at Connellsville, Pa. A suit in equity was entered against the company by the Connellsville Machine & Car Supply Co. and the First National Bank of Greensburg, setting forth that the company was unable to meet its liabilities. The plant of the Sligo Iron & Steel Co. at Connellsville contains a plant of 19 single puddling furnaces and a full complement of finishing mills, the products being muck bars, iron bars and sheared plates.

IRON AND INDUSTRIAL STOCKS

Recent Selling Based on Condition of Iron and Steel Markets

Liquidation of securities continued the past week. Oil and sugar issues, because of further drastic cuts in raw market quotations, have been conspicuously soft. The general desire to sell stocks, however, appears to be based on something more substantial than oil and sugar. A study of business circles in former years shows prosperity very largely is based on a free consumption of iron and steel and our crops. Our steel industry is on an extremely low operating basis. Our cotton crop promises to be considerably smaller than those of recent years, and while the latest Government grain crop figures are more reassuring, much can happen between now and harvesting days. Finally, the consumption of cotton and of grains is decreasing rather than increasing and will continue as crops in foreign countries mature. The ability of industry as a whole to earn interest on capital invested therefore largely rests on the status of the steel market. With further passing of and reduction in dividend disbursements by steel producing companies, selling of such securities is a natural sequence.

The range of prices on active iron and industrial stocks from Saturday of last week to Monday of this week was as follows:

Allis-Chalm. com.	30¾ - 33	Lackawanna Steel.	37 - 40
Allis-Chalm. pf...	71 - 72	Midvale Steel.....	22⅝ - 23¾
Am. Can com.....	26½ - 28¾	Nat.-Acme	14½ - 19¼
Am. Can pf.....	78½ - 80	Nat. E. & S. com.	46 - 51½
Am. C. & F. com.	115¼ - 125½	Nat. E. & S. pf...	— - 89
Am. C. & F. pf...	— - 108⅛	N. Y. Air Brake..	55 - 59
Am. Loco. com...	74 - 82	Nova Scotia Steel.	21¼ - 24½
Am. Loco. pf.....	— - 98½	Press. Steel com..	69 - 75
Am. Radiator com.	— - 70	Press. Steel pf....	— - 87½
Am. Steel F. com.	25 - 27	Ry. Stl. Spg. com.	76½ - 80
Bald. Loco. com..	66½ - 75¾	Replogle Steel.....	21 - 23⅞
Beth. Steel com..	45 - 53½	Republic com.....	44¾ - 48¼
Beth. Stl., Cl. B..	47¼ - 53½	Republic pf.....	80 - 81
Beth. Stl., 8% pf..	97 - 99¼	Sloss com.....	34 - 36
Chic. Pneu. Tool..	55 - 59	Superior Steel.....	28 - 30
Colorado Fuel.....	25¾ - 28	Transue-Williams.	32½ - 34
Cruc. Steel com...	52 - 57	Un. Alloy Steel....	20⅛ - 23½
Cruc. Steel pf.....	— - 82	U. S. Pipe com...	13¼ - 13⅝
General Electric..	120⅝ - 126	U. S. Pipe pf.....	— - 40
Gt. No. Ore Cert..	26¼ - 27½	U. S. Steel com...	73½ - 76⅞
Gulf States Steel.	28⅛ - 31½	U. S. Steel pf.....	106⅛ - 107⅝
Int. Har. com.....	80½ - 87	Vanadium Steel...	26⅛ - 30½
Int. Har. pf.....	— - 101¼	Westingh'se Elec.	43½ - 45⅛

Merger of Massillon Companies

A meeting of the stockholders of the Central Steel Co., Massillon Rolling Mill Co. and National Pressed Steel Co., Massillon, Ohio, has been called for July 7 to take action on the proposed merger of these companies. Under the plan of consolidation as proposed by the boards of directors of the three companies, the Central Steel Co. will acquire the properties of the two affiliated companies and will be reorganized with 300,000 shares of common stock without par value and 100,000 shares of 8 per cent preferred stock with a par value of $100. The exchange of stock will be made upon the following basis:

One share of Central Steel 8 per cent cumulative preferred stock for each one share of the 7 per cent Central Steel preferred stock, for each share of the Massillon Rolling Mill preferred stock, and for each share of the National Pressed Steel 7 per cent preferred stock outstanding; 7 1-3 shares of Central Steel common stock for each share of the Central Steel common stock; 7 shares of Central Steel common stock for each share of Massillon Rolling Mill common stock, and 3 shares of Central Steel common stock for each share of National Pressed Steel common stock.

The total stock to be issued will be 59,365 shares of 8 per cent preferred and approximately 164,000 shares of common stock. The plan also includes a proposed authorization of $10,000,000 in 20-year 8 per cent non-callable bonds. However, only $5,000,000 in the bonds are to be issued under this authority, the balance of said bond issue to be issued and sold only upon consent and approval of at least 75 per cent of the preferred capital stock of the company outstanding.

The assets of the three companies as shown by the consolidated balance sheet of Dec. 31, 1920, include current assets of $7,855,888, fixed assets, less reserves for depreciation and amortization, $10,145,917, and total assets, less deferred charges, of $18,069,324. The current liabilities, including notes and trade acceptances payable, accounts payable and accrued accounts, including estimated reserve for federal taxes, amount to $5,567,477.

Industrial Finances

Creditors of the Moline Plow Co. have been requested to deposit claims with two committees, one representing bank and merchandise claims, the other the serial noteholders. The sudden falling off of sales in 1920 left an increased debt of $10,000,000 above normal, reflected in corresponding increase in inventory.

The Massachusetts superior court on June 14 allowed a petition for a receiver for the National Sales Machine Co., Worcester, Mass., but did not pass on the application for dissolution of the company, which has an authorized capital of $1,500,000. A receiver will be named within a few days.

The Defiance Machine Works, Defiance, Ohio, is offering a new stock issue of $300,000 in cumulative 8 per cent preferred stock and $300,000 in common stock.

Henry J. Griesel, cashier Barton State Bank, Barton, Wis., has been appointed receiver of the Barton Axle Co., of the same place, upon application of Arthur Duenkel and J. Goebel, creditors.

The Kahn Mfg. Co., 2601 Vliet Street, Milwaukee, manufacturer of spark plugs and other ignition specialties for gas engines, has been adjudged bankrupt on involuntary proceedings instituted several weeks ago.

The American Bosch Magneto Corporation, Springfield, Mass., has omitted the quarterly dividend of $1.25 a share due at this time. In both its ignition and starting and lighting departments there are $8,000,000 unfilled orders on hand, but many are held up pending a resumption of general business.

The National Conduit & Cable Co. reports net sales for the quarter ended March 31, last, as $831,425, contrasted with $3,638,354 for the corresponding period last year, a decrease of $2,806,929. After deducting manufacturing and selling costs and inventory losses, there was a net loss in operations of $175,843, as against an operating profit of $117,651 last year.

The Octagon Drop Forge Co., 2428 Lowe Avenue, Chicago, has increased its capital stock from $30,000 to $105,000.

The Link-Belt Co., Chicago, has increased its capital stock from $7,350,000 to $9,750,000.

The Ann Arbor Foundry Co., Ann Arbor, Mich., has increased its capitalization from $5,000 to $15,000.

The Thomas Furnace Co., Milwaukee, has increased its capital stock to $900,000. It has been specializing in low phosphorus iron for some time. Improvements costing about $100,000 have been made in the plant in recent months.

The Hydro Appliances, Ltd., recently incorporated with a capital stock of $200,000, has purchased the former plant of the Dominion Canners, Ltd., Port Robinson, Ont., and expects to have it in operation within a month. It will manufacture electric appliances, concentrating on an electric washer and ironing machine.

Trade Changes

The Adell Mfg. Co., East River Street, Orange, Mass., steel, iron and other products, and its plant and land holdings, have been taken over by the Adell Mfg. Co., Inc. John A. Adell is president and Carl C. Harris is treasurer.

The firm name of the Bryce Mfg. Co., Forestville, Conn., has been changed to the Motor Parts Corporation.

The Henry & Wright Mfg. Co., Hartford, Conn., has changed its New York office to Grand Central Palace, fifth floor.

Harold A. Wright, 28 Austin Street, Newtonville, Mass., and Frank E. Alexander, 107 George Street, Providence, R. I., president and treasurer, respectively, have incorporated as the Wright-Alexander Co., 201 Devonshire Street, Boston, room 302, under Massachusetts laws, as machine tool representatives.

The Reilly-Peabody Fuel Co. has moved its offices to 1607 Oliver Building, Pittsburgh.

A. Locke & Co., Sheboygan, Wis., wholesale dealers in scrap metals and waste materials of all kinds, have sold the business to Gus. Holman & Co., also engaged in this business at Sheboygan.

The Schwinn Foundry & Machine Co., East Dubuque, Iowa, has changed its name to the Dubuque Foundry Corporation.

The Geometrical Tool Co., New Haven, Conn., special machinery and screw thread and tapping tools, has taken over the exclusive sale of products manufactured by the Charles L. Jarvis Co., Gildersleeve, Conn., consisting of high speed tapping devices, quick change chucks and collets and combination tapping devices equipped with quick change chucks.

The New York offices of the Canton Foundry & Machine Co., Canton, Ohio, and its exporting agency, the International Purchasing Bureau, have been moved to 45 West Eighteenth Street, that city, where there will be on exhibit Canton portable cranes, alligator shears, turntables, etc.

NEW TRADE PUBLICATIONS

Fences.—Anchor Post Iron Works, Garwood, N. J. Catalog No. 56. Size 8½ x 11 in., 36 pages. Complete, concise and practical information on Anchor Post wire fences, gates and electrically welded railings and gates for industrial and other purposes. Different fences are grouped under separate type numbers with illustrations and detailed specifications. An illustrated index is included for convenient reference.

Automatic Counters.—Root Co., Bristol, Conn. Catalog No. 31. Describes various types and sizes of Root counters, used in recording production. The illustrations include installation on machines of various classes, including stamping presses and textile machinery. Size 7 x 10 in., 32 pages.

Pipe Stills.—Power Specialty Co., 111 Broadway, New York. Bulletin 202. A discussion of the conventional tank still and the pipe still for oil refinery work, including a description of oil-heating apparatus. Curves, tables and other useful data are given. Size, 8 x 10½ in., 40 pages.

Stock List.—Horace T. Potts & Co., Philadelphia. Thirteenth edition of steel and iron stock list, including stocks carried of welding supplies, bearing metals and box strapping. Size 5¼ x 7 in., 92 pages, thumb indexed for ready reference.

Stock List.—Carlyle Johnson Machine Co., Manchester, Conn. List of single and double slow speed Johnson friction clutches on hand for immediate shipment. A sheet listing additional special sizes, slow speed and high speed, has also been issued.

Forge Blowers.—New Jersey Meter Co., Plainfield, N. J. Blower Bulletin No. 1. Four pages, 6 x 9 in. Describes construction and operation of forge blower recently brought out, furnished in two sizes, to deliver air up to 4 in., water pressure with higher pressures obtainable by means of special jet nozzles.

Electric Cranes.—Alfred Box & Co., Inc., Philadelphia. Bulletin 3000. Size 8½ x 11 in., 33 pages. Describes and illustrates box type B standard traveling crane; type LHR, designed to operate within close clearance, and type SBE for use in side bays. The construction is taken up in detail and the material arranged for convenience to the engineer. A section illustrates various installations.

Coal Crushers.—Orton & Steinbrenner Co., Chicago. Catalog No. 19. Devoted to description of the design and operation of the O S dependable coal crushers. A section illustrates various types of O S locomotive cranes and buckets. Size 6 x 9 in., 23 pages.

Electric Cranes.—Pittsburgh Crane & Equipment Co., Sharpsburg Station, Pittsburgh. Bulletin 303. Describes electric overhead traveling cranes and trolleys and electric jib cranes. The illustrations include views of typical installations. Size 6 x 9 in., 8 pages.

Production Lathes.—Porter-Cable Machine Co., Syracuse, N. Y. Booklet, 8⅜ x 11 in., 16 pages. Features of construction outlined and extra equipment and attachments described and illustrated. Examples of multiple tooling are given and plain and universal high-speed milling attachments are illustrated.

Electrical Instruments. — Sangamo Electric Co., Springfield, Ill. Bulletin 56. Devoted to description of amperehour meter for controlling electroplating operations. The special type described is calibrated to read in weights of metal deposited. Wiring diagrams, prices and a list of users is included. Size 8 x 10½ in., 4 pages.

Electric Hoists.—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin No. 1819. Illustrates and describes small standard mine hoists for rope pulls, up to and including 7000 lb., single and double drum. The construction of large mine hoists is also described in detail, the illustrations covering actual special installations. Several pages are devoted to line drawings of typical hoists, giving an idea of the design and approximate floor space required. The bulletin should be of genuine value in working up preliminary data or estimates. Size 8 x 10½ in., 72 pages.

Copper Products.—American Brass Co., Waterbury, Conn. Booklet. List of extras on copper products, sheets, rolls, wire, rods and bars. Several pages of useful tables are given. Size 4 x 6¾ in., 64 pages.

Tobin Bronze.—American Brass Co., Ansonia, Conn. Booklet. Size 4 x 6¾ in. Gives the uses, forms furnished and various tests of Tobin bronze. Space is given to testimonial letters from representative concerns using this material. Useful tables are included.

Air Compressors and Vacuum Pumps.—Pennsylvania Pump & Compressor Co., Easton, Pa. Form No. 101. Illustrates and describes various features of Pennsylvania compressors and pumps, power and steam driven straight line, single stage types. Tables of capacities are included. Size 6 x 9 in., 16 pages.

Taps.—John Bath & Co., Inc., Worcester, Mass. Bulletin No. 15. Describes Bath Easy Cut ground taps, giving sizes and method of manufacture. Size 6 x 9 in., 7 pages.

Control Apparatus.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., descriptive leaflet 3982, featuring Type F magnetic-switch double-section control panels, together with Type 22-F magnetic-switch control panels. Nine diagrams and dimension diagrams of apparatus are listed.

Wheel Presses.—Hydraulic Press Mfg. Co., Mount Gilead, Ohio. Catalog No. 47. Size 8 x 10 in., 12 pages. Describes vertical type hydraulic wheel press, 2 and 3 plunger, with and without base plate; also inclined type, 2 and 3 plunger, motor driven. Specifications and general description are given. Sizes run from 50 to 600 ton.

Roller Bearings.—Hyatt Roller Bearing Co., 709 Sixth Avenue, New York. Report covering the advantages and method of installation of Hyatt bearings for trucks of all kinds. Bound in specification form, 15 pages. Illustrations cover 12 full pages.

Welding Equipment.—Davis-Bournonville Co., Jersey City, N. J. Circular describing acetylene generators, welding and cutting torches, pressure regulators, portable outfits and supplies. Size 6 x 9 in., 16 pages.

Electric Hoists.—Electric Hoist Manufacturers Association, 165 Broadway, New York. Ten page leaflet, 8½ x 11 in., giving partial list of uses in various industries to which electric hoists have been applied.

Drilling Machines.—J. E. Snyder & Son, Worcester, Mass. Catalog 1921. Size 6 x 9 in., 51 pages. Illustrates and describes line of upright drilling machines, giving dimensions and construction features. The machines described include 23, 24, 25, 28, 30, 36 in. sizes, belt and motor driven, stationary and sliding head, plain, compound and tilting tables. A special drill for tool room, jig work, keyseating and milling surfaces is included. A schedule of repair parts for these machines is given.

Barrel and Keg Machinery.—Peter Gerlach Co., Cleveland, Booklet, 8½ x 11 in., 96 pages. Illustrates and describes drag saws, bolt equalizers; sawing machines; stave pointers, listers, planers and crozers; heading machines; hoop machinery and saws. The process of manufacturing light barrel staves and heads is outlined and illustrated.

Flexible Shaft Equipment.—N. A. Strand & Co., Machinery Hall, Chicago. Catalog No. 21. Illustrates and describes construction features of Strand flexible shafts and flexible shaft machinery, bench and portable for grinding, drilling, cleaning and buffing. A truck-mounted machine with swivel base and various attachments and countershaft equipment are included. Size 7½ x 10½ in., 28 pages.

Excavating Cranes.—Pawling & Harnischfeger Co., Milwaukee, Wis. Bulletin No. 6X. Describes the features and illustrates the uses of the No. 206 full revolving corduroy, portable crane and excavator and shovel attachment. Size 8½ x 11 in., 4 pages.

Small Tools.—Consolidated Tool Works, Inc., 296 Broadway, New York. Catalog B. Describes various styles of hack saw frames; smooth and jack planes; hand and breast drills; tap wrench and coping saw. A description of the Simplex micrometer is included.

Vacuum Pumps.—Nash Engineering Co., South Norwalk, Conn. Bulletin No. 15. Size 7½ x 10½ in., 8 pages. Devoted to description of the Jennings Hytor vacuum pump direct connected to electric motor for return line heating system and other vacuum work.

Centrifugal Pumps.—Dayton-Dowd Co., Quincy, Ill. Bulletin No. 244. Describes motor, belt, turbine and gasoline engine drive designs. Features of construction are given and the illustrations include sectional views and actual installations. Curves are given showing characteristics of various sizes.

Locomotive Cranes.—Browning Co., Cleveland. Catalog, 48 pages, twelve pages of which are devoted to a detailed description of the Browning locomotive cranes with illustrations and tables of capacities. The remainder of the catalog is taken up with illustrations showing the crane in use for handling various kinds of material in many industries.

"Ten Years Progress in Water Works Pumps" is the subject of a manual 8½ x 11 in., 100 pages, issued by the De Laval Steam Turbine Co., Trenton, N. J. The first half of the book is devoted to a discussion of the economy of different types of pumping units, including also description and illustrations of several installations of turbine-driven centrifugal pumps in municipal pumping plants. The second half takes up the testing of steam turbines and centrifugal pumps and the measurement of head and discharge. The data presented on the measurement of water by means of Venturi tubes, pilot tubes, orifices and weirs has been assembled from English, German and French sources and is unusually complete.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Metal Markets."

Iron and Soft Steel Bars and Shapes

	Per Lb.
Bars:	
Refined bars, base price	3.23c.
Swedish bars, base price	12.00c.
Soft steel bars, base price	3.23c.
Hoops, base price	4.15c. to 4.28c.
Bands, base price	3.88c.
Beams and channels, angles and tees 3 in. x ¼ in. and larger, base	3.23c. to 3.33c.
Channels, angles and tees under 3 in. x ¼ in., base	3.23c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.23c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	3.43c.
Toe calk, ½ x ⅜ in. and larger	3.75c.
Cold-rolled strip, soft and quarter hard	10.00c. to 10.50c.
Open-hearth spring steel	4.50c. to 8.00c.
Shafting and Screw Stock:	
Rounds	4.38c. to 4.73c.
Squares, flats and hex	4.98c. to 5.23c.
Standard cast steel, base price	14.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier ..... 3.23c. to 3.33c.

Sheets

Blue Annealed

	Per Lb.
No. 10	4.23c.
No. 12	4.28c.
No. 14	4.33c.
No. 16	4.44c.

Box Annealed—Black

	Soft Steel C.R., One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.95c. to 5.18c.	.....
Nos. 22 and 24	5.00c. to 5.23c.	5.60c.
No. 26	5.05c. to 5.28c.	5.65c.
No. 28	5.15c. to 5.38c.	5.75c.
No. 30	5.40c. to 5.63c.	.....

No. 28, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	4.75c. to 5.38c.
No. 16	5.00c. to 5.63c.
Nos. 18 and 20	5.15c. to 5.78c.
Nos. 22 and 24	5.30c. to 5.93c.
No. 26	5.45c. to 6.08c.
No. 27	5.60c. to 6.23c.
No. 28	5.75c. to 6.38c.
No. 30	6.25c. to 6.88c.

No. 28, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel			*Wrought Iron*		
	Blk.	Galv.		Blk.	Galv.
½ in. Butt...	—46	—30	¾ in Butt....	—18	List
¾ in. Butt...	—52	—37	1-1½ in. Butt.	—20	— 2
1-3 in. Butt..	—54	—40	2 in. Lap	—14	+ 3
3½-6 in. Lap.	—49	—35	2½-6 in Lap..	—18	— 2
7-12 in. Lap..	—40	—24	7-12 in. Lap..	— 7	+10

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	4.50c.
Annealed soft	4.50c.
Galvanized annealed	5.25c.
Coppered basic	5.00c.
Tinned soft Bessemer	6.50c.

*Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	16 c. to 19¼c.
High brass wire	17¼c. to 21¾c.
Brass rod	15 c. to 20¾c.
Brass tube, brazed	29½c. to 31½c.
Brass tube, seamless	19½c. to 20½c.
Copper tube, seamless	22½c. to 23¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 22c. to 24c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14x20	
		Primes	Wasters
Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	80 lb....	
IC.. $11.10	$10.00	IC... 7.70	7.45
IX.. 12.30	11.25	IX... 8.60	8.35
IXX.. 14.10	12.75	IXX... 9.60	9.35
IXXX.. 16.10	14.75	IXXX...11.00	10.75
IXXXX.. 17.70	16.50	IXXXX...12.00	11.75

Coke—14x20	
80 lb....	$7.30 $7.05
90 lb....	7.40 7.15
100 lb....	7.50 7.25

Terne Plates

8-lb. Coating 14 x 20

100 lb.	$8.00
IC	8.25
IX	8.50
Fire door stock	11.50

Tin

Straits pig	32½c.
Bar	38c. to 40c.

Copper

Lake ingot	16c.
Electrolytic	16c.
Casting	16c.

Spelter and Sheet Zinc

Western spelter	6½c. to 6¾c.
Sheet zinc, No. 9 base, casks	11½c. open 12c.

Lead and Solder*

American pig lead	5½c.
Bar lead	6¼c. to 6¾c.
Solder, ½ and ½ guaranteed	24¼c.
No. 1 solder	21½c.
Refined solder	18½c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb	80c.
Commercial grade, per lb	40c.
Grade D, per lb	35c.

Antimony

Asiatic ..... 6½c. to 7c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.... 30c. to 33c.

Old Metals

The market is quiet with an easier tone. Business is practically nil. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible	10.25
Copper, heavy and wire	9.50
Copper, light and bottoms	8.00
Brass, heavy	5.50
Brass, light	4.25
Heavy machine composition	9.00
No. 1 yellow brass turnings	4.75
No. 1 red brass or composition turnings	7.00
Lead, heavy	3.50
Lead, tea	2.50
Zinc	2.75